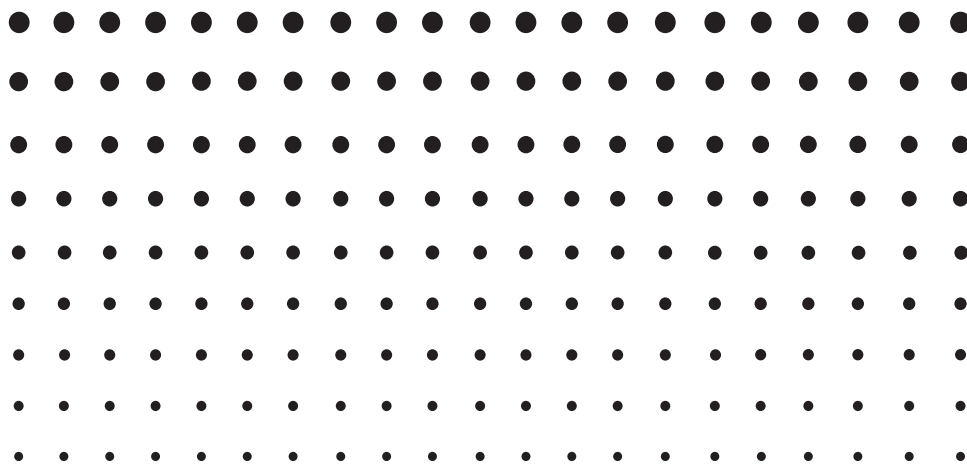


fx-CG500

Examples



CASIO Education website URL

<http://edu.casio.com>

Download Free trial software and Support software

<http://edu.casio.com/dl/>

Manuals are available in multi languages at

<http://world.casio.com/manual/calc>

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About this booklet...

This booklet contains a collection of examples of operations explained in the fx-CG500 User's Guide.

Use this booklet in combination with the User's Guide.

Chapter 2: Main Application

0201

Calculation	Key Operation
$56 \times (-12) \div (-2.5) = 268.8$	$\boxed{5} \boxed{6} \boxed{\times} \boxed{(} \boxed{\leftarrow} \boxed{1} \boxed{2} \boxed{)} \boxed{\div} \boxed{(} \boxed{\leftarrow} \boxed{2} \boxed{\cdot} \boxed{5} \boxed{)} \boxed{\text{EXE}}$
$2 + 3 \times (4 + 5) = 29$	$\boxed{2} \boxed{+} \boxed{3} \boxed{\times} \boxed{(} \boxed{4} \boxed{+} \boxed{5} \boxed{)} \boxed{\text{EXE}}$
$\frac{6}{4 \times 5} = 0.3$	$\boxed{6} \boxed{\div} \boxed{(} \boxed{4} \boxed{\times} \boxed{5} \boxed{)} \boxed{\text{EXE}}$ or $\boxed{\frac{\square}{\square}} \boxed{6} \boxed{\downarrow} \boxed{4} \boxed{\times} \boxed{5} \boxed{\text{EXE}}$ * The soft keyboard [Math1] key set

0202 $2.54 \times 10^3 = 2540$ $\boxed{2} \boxed{\cdot} \boxed{5} \boxed{4} \boxed{\text{EXP}} \boxed{3} \boxed{\text{EXE}}$
 $1600 \times 10^{-4} = 0.16$ $\boxed{1} \boxed{6} \boxed{0} \boxed{0} \boxed{\text{E}} \boxed{-} \boxed{4} \boxed{\text{EXE}}$

2.54E3	2540
1600E-4	0.16

0203 $123 + 456 = 579$ $\boxed{1} \boxed{2} \boxed{3} \boxed{+} \boxed{4} \boxed{5} \boxed{6} \boxed{\text{EXE}}$
 $789 - 579 = 210$ $\boxed{7} \boxed{8} \boxed{9} \boxed{-} \boxed{\text{ans}} \boxed{\text{EXE}}$
 $210 \div 7 = 30$ $\boxed{210} \boxed{\div} \boxed{7} \boxed{\text{EXE}}$

123+456	579
789-ans	210
ans/7	30

0204 $\boxed{\times} \boxed{:} \boxed{=} \boxed{1} \boxed{2} \boxed{3} \boxed{\text{EXE}}$

x:=123	123
--------	-----

0205 Tapping $\boxed{\frac{\square}{\square}}$ while the calculator is configured for Standard mode (Normal 1) display

Expression	Calculator Operation	Displayed Result
$100 \div 6 = 16.6666666\dots$	$\boxed{1} \boxed{0} \boxed{0} \boxed{\div} \boxed{6} \boxed{\frac{\square}{\square}}$ (Switches to Decimal mode format.)	16.66666667
	$\boxed{\frac{\square}{\square}}$ (Switches back to Standard mode format.)	$\frac{50}{3}$

0206 Tapping $\boxed{\frac{\square}{\square}}$ while the calculator is configured for Decimal mode (Normal 1) display

Expression	Calculator Operation	Displayed Result
$\sqrt{2} + 2 = 3.414213562\dots$	$\boxed{\sqrt{\square}} \boxed{2} \boxed{+} \boxed{2} \boxed{\frac{\square}{\square}}$ (Switches to Standard mode format.)	$\sqrt{2} + 2$
	$\boxed{\frac{\square}{\square}}$ (Switches back to Decimal mode format.)	3.414213562

0207 (Complex mode and Real mode calculation results)

Expression	Complex Mode	Real Mode
solve ($x^3 - x^2 + x - 1 = 0, x$)	$\{x = -i, x = i, x = 1\}$	$\{x = 1\}$
$i + 2i$	$3i$	ERROR: Non-Real in Calc
$(1 + \sqrt{3}i) \angle (2, 45^\circ)$	$\angle (4, 105)$	ERROR: Non-Real in Calc

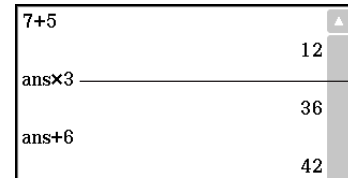
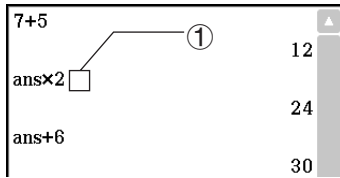
0208 (Assistant mode and Algebra mode calculation results)

Expression	Assistant Mode	Algebra Mode
$x^2 + 2x + 3x + 6$	$x^2 + 2 \cdot x + 3 \cdot x + 6$	$x^2 + 5 \cdot x + 6$
expand $((x+1)^2)$	$x^2 + 2 \cdot x \cdot 1 + 1^2$	$x^2 + 2 \cdot x + 1$
$x + 1$ (When 1 is assigned to x)	$x + 1$	2

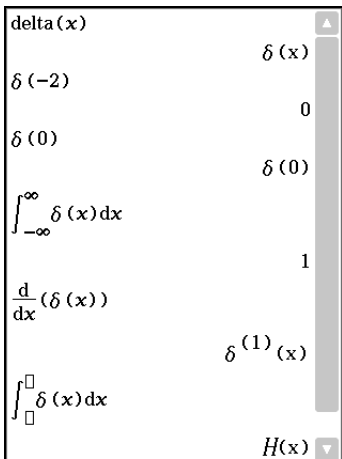
0209

1. Tap location ①.

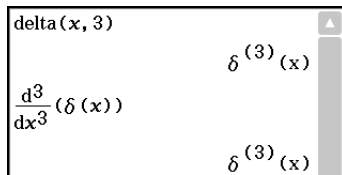
2. \leftarrow $\boxed{3}$ $\boxed{\text{EXE}}$



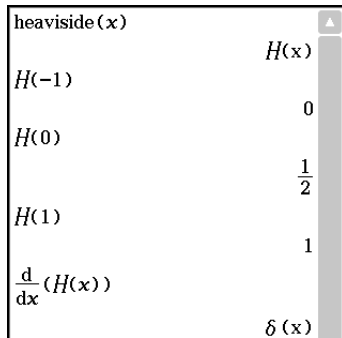
0210



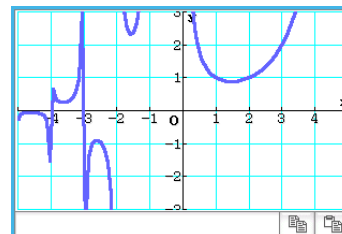
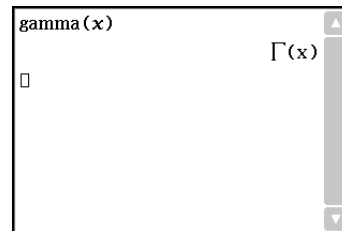
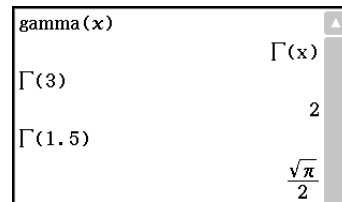
0211



0212



0213



0214

$\{ 1, 2, 3 \} \Rightarrow \text{lista}$ $\boxed{\text{EXE}}$

or

$\{ \} \boxed{1} \boxed{,} \boxed{2} \boxed{,} \boxed{3} \boxed{\rightarrow} \Rightarrow \text{lista}$ $\boxed{\text{EXE}}$

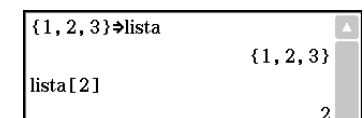


0215

$\text{lista} \boxed{[} \boxed{2} \boxed{]} \boxed{\text{EXE}}$

or

$\text{lista} \boxed{[} \boxed{\leftarrow} \boxed{2} \boxed{\text{EXE}}$



0216 $\boxed{5} \Rightarrow \boxed{1} \boxed{i} \boxed{s} \boxed{t} \boxed{a} \boxed{[} \boxed{2} \boxed{]} \boxed{EXE}$

```
{1, 2, 3} → lista
lista[2]      {1, 2, 3}
5 → lista[2]  2
              {1, 5, 3}
```

Tip: You can also perform the above operations on the “ans” variable when it contains LIST data.

Example: $\{1, 2, 3\} \boxed{EXE} \quad \{1, 2, 3\}$
 $\boxed{ans} \boxed{[} \boxed{2} \boxed{]} \boxed{EXE} \quad 2$

0217 $\boxed{1} \boxed{i} \boxed{s} \boxed{t} \boxed{3} \boxed{X} \boxed{\{}$ $\boxed{6} \boxed{,}$ $\boxed{0} \boxed{,}$ $\boxed{4} \boxed{\}}$ \boxed{EXE}

```
{41, 65, 22} → list3
list3 × {6, 0, 4}
{246, 0, 88}
```

0218 $\boxed{\{}$ $\boxed{1} \boxed{0} \boxed{,}$ $\boxed{2} \boxed{0} \boxed{,}$ $\boxed{3} \boxed{0} \boxed{\}}$ \Rightarrow $\boxed{\{}$ $\boxed{x} \boxed{,}$ $\boxed{y} \boxed{,}$ $\boxed{z} \boxed{\}}$ \boxed{EXE}

```
{10, 20, 30} → {x, y, z}
{10, 20, 30}
```

0219 $\boxed{[}$ $\boxed{[}$ $\boxed{1} \boxed{,}$ $\boxed{2} \boxed{]}$ $\boxed{[}$ $\boxed{3} \boxed{,}$ $\boxed{4} \boxed{]}$ $\boxed{]} \Rightarrow$ $\boxed{m} \boxed{a} \boxed{t} \boxed{1} \boxed{EXE}$
 or
 $\boxed{[}$ $\boxed{\leftarrow}$ $\boxed{[}$ $\boxed{\leftarrow}$ $\boxed{1} \boxed{,}$ $\boxed{2} \boxed{\rightarrow}$ $\boxed{[}$ $\boxed{\leftarrow}$ $\boxed{3} \boxed{,}$ $\boxed{4} \boxed{\rightarrow}$ $\boxed{\rightarrow}$ \Rightarrow
 $\boxed{m} \boxed{a} \boxed{t} \boxed{1} \boxed{EXE}$

```
Edit Action Interactive
[[1, 2][3, 4]] → mat1
[ 1 2 ]
[ 3 4 ]
```

0220 $\boxed{m} \boxed{a} \boxed{t} \boxed{1} \boxed{[}$ $\boxed{2} \boxed{,}$ $\boxed{1} \boxed{]}$ \boxed{EXE}
 ↑ ↑
 Row Column

```
[[1, 2][3, 4]] → mat1
[ 1 2 ]
[ 3 4 ]
mat1[2, 1]
3
```

0221 $\boxed{5} \Rightarrow \boxed{m} \boxed{a} \boxed{t} \boxed{1} \boxed{[}$ $\boxed{1} \boxed{,}$ $\boxed{2} \boxed{]}$ \boxed{EXE}

```
mat1[2, 1]
3
5 → mat1[1, 2]
[ 1 5 ]
[ 3 4 ]
```

Tip: You can also perform the above operations on the “ans” variable when it contains MATRIX data.

0222

1. $\boxed{\left[\begin{smallmatrix} \square & \square \end{smallmatrix} \right]}$ (Creates a 1-row × 2-column matrix.)

$\boxed{1} \boxed{\rightarrow} \boxed{2}$

```
[1 2]
```

2. $\boxed{\left[\begin{smallmatrix} \square & \square & \square \end{smallmatrix} \right]}$ (Adds one column to the matrix.)

$\boxed{3}$

```
[1 2 3]
```

3. $\boxed{\left[\begin{smallmatrix} \square & \square & \square \\ \square & \square & \square \end{smallmatrix} \right]}$ (Adds one row to the matrix.)

$\boxed{4} \boxed{\rightarrow} \boxed{5} \boxed{\rightarrow} \boxed{6}$

```
[1 2 3]
[4 5 6]
```

4. Assign the matrix to the variable named “mat2”.

$\boxed{\rightarrow} \Rightarrow \boxed{m} \boxed{a} \boxed{t} \boxed{2} \boxed{EXE}$

```
[1 2 3] → mat2
[4 5 6]
[ 1 2 3 ]
[ 4 5 6 ]
```

0223 [[1 , 1] [2 , 1]] +
 [[2 , 3] [2 , 1]] EXE

[[1,1][2,1]]+[[2,3][2,1]]
 [3 4]
 [4 2]

0224 [1] [1] [2] [1]

[1 1]
 [2 1]

[X]

[1 1]
 [2 1] x

[2] [3] [2] [1] EXE

[1 1] x [2 3]
 [2 1] x [2 1]
 [4 4]
 [6 7]

0225 [[1 , 2] [3 , 4]] X 5 EXE

[[1,2][3,4]]x5
 [5 10]
 [15 20]

0226 [[1 , 2] [3 , 4]] ^ 3 EXE

[[1,2][3,4]]^3
 [37 54]
 [81 118]

0227 [1] [2] [3] [4] [3] EXE

[1 2]³
 [3 4]
 [37 54]
 [81 118]

0228 [1 0] [2 0] [3 0] [X] [Y] [Z] EXE

[10] [x]
 [20] [y]
 [30] [z]
 [10]
 [20]
 [30]

0229

1. Tap the down arrow button next to the fdx button, and then tap Bin .
2. [1 0 1 1 1] + [1 1 0 1 0] EXE

10111+11010
 110001b

0230

1. Tap the down arrow button next to the fdx button, and then tap Oct .
2. [(1 1 + 7)] ^ 2 EXE

(11+7)^2
 400o

0231

1. Tap the down arrow button next to the fdx button, and then tap Hex .
2. [1 2 3] d + [1 0 1 0] b EXE

123d+1010b
 85h

0232

1010_2 and $1100_2 = 1000_2$ (Number base: Binary)

1 0 1 0 Space a n d Space 1 1 0 0 EXE

1011_2 or $11010_2 = 11011_2$ (Number base: Binary)

1 0 1 1 Space o r Space 1 1 0 1 0 EXE

1010_2 xor $1100_2 = 110_2$ (Number base: Binary)

1 0 1 0 Space x o r Space 1 1 0 0 EXE

not ($FFFF_{16}$) = $FFFF0000_{16}$ (Number base: Hexadecimal)

n o t (f f f f) EXE

1010 and 1100
1000b

1011 or 11010
11011b

1010 xor 1100
110b

not (ffff)
FFFF0000h

0233

baseConvert(5 7 9 , 1 5 , 1 2) EXE

baseConvert(1 0 0 , 1 3 , 1 0) EXE

baseConvert(1 2 3 , 1 6 , 3) EXE

baseConvert(579,15,12)
873
baseConvert(100,13,10)
169
baseConvert(123,16,3)
101210

0234

Since a solution of $s = 1$ is obtained for point P, it means it exists on straight line l .

A solution cannot be obtained (No Solution) for s in the case of point Q, so it means that the point does not exist on straight line l .

solve($\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + s \times \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} = \begin{bmatrix} 5 \\ 7 \\ 9 \end{bmatrix}$, s)
{s=1}
solve($\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + s \times \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix} = \begin{bmatrix} 5 \\ 7 \\ 8 \end{bmatrix}$, s)
No Solution

0235

1. $x^3 - 3x^2 + 3x - 1$

2. Drag the stylus across the expression to select it.

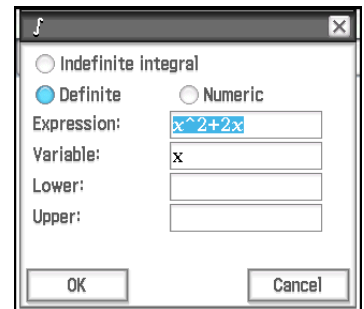
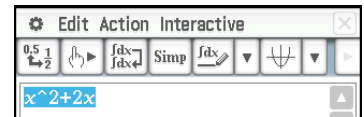
Edit Action Interactive
0.5 1/2 fdx fdy Simp fdy
 $x^3 - 3x^2 + 3x - 1$

3. Tap [Interactive], [Transformation], [factor], and then [factor].

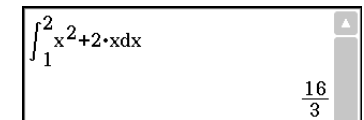
factor($x^3 - 3x^2 + 3x - 1$)
(x-1)³

0236

1. $x^2 + 2x$
2. Drag the stylus across the expression to select it.
3. Tap [Interactive], [Calculation], and then [\int]. This displays the \int dialog box.
4. Tap “Definite” to select it.
5. Input the required data for each of the following three arguments.
Variable: x , Lower: 1, Upper: 2

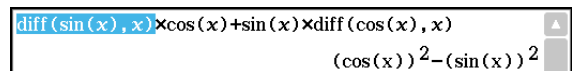
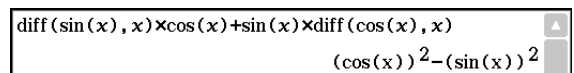


6. Tap [OK].

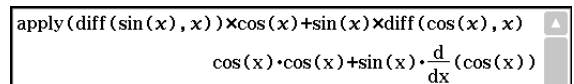


0237

1. Input the calculation below and execute it.
 $\text{diff}(\sin(x),x) \times \cos(x) + \sin(x) \times \text{diff}(\cos(x),x)$
2. Drag the stylus across “diff(sin(x),x)” to select it.

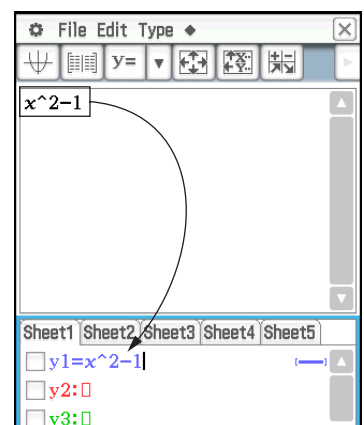


3. Tap [Interactive], [Assistant] and then [apply].
 - This executes the part of the calculation you selected in step 2. The part of the calculation that is not selected ($\times \cos(x) + \sin(x) \times \text{diff}(\cos(x),x)$) is output to the display as-is.




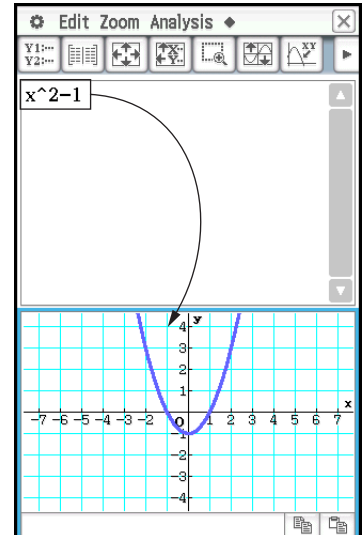
0238


1. Tap $y1=x^2-1$ to display the Graph Editor window in the lower window.
2. Drag the stylus across “ $x^2 - 1$ ” in the work area to select it.
3. Drag the selected expression to the Graph Editor window.
 - This copies the expression to the location where you dropped it.

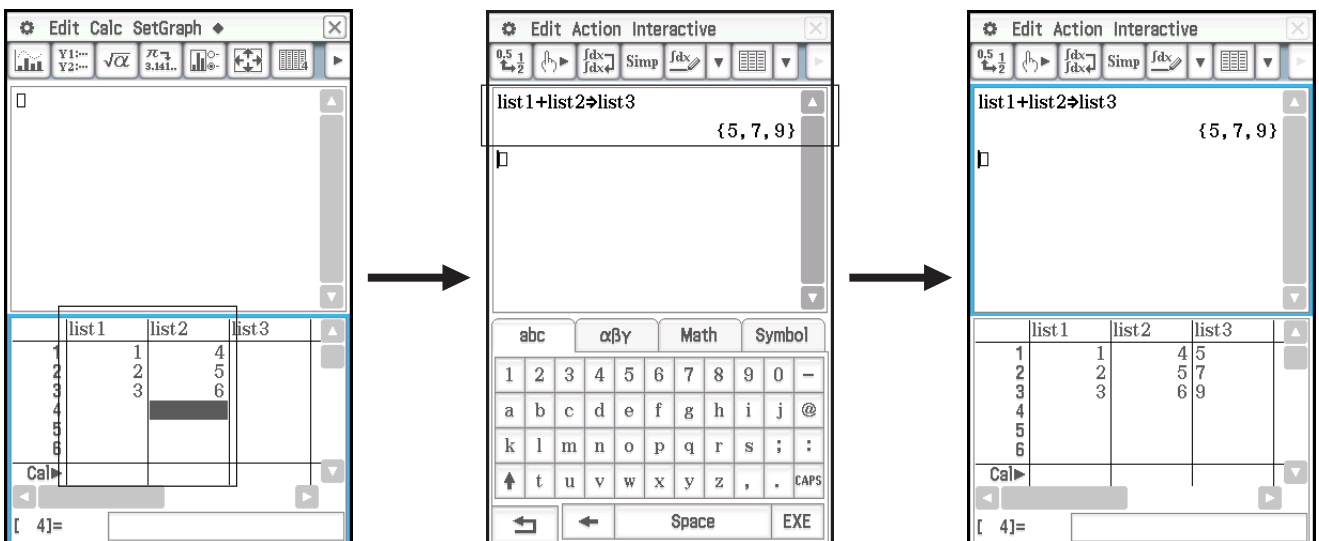


0239

1. Tap  to display the Graph window in the lower window.
2. Drag the stylus across “ $x^2 - 1$ ” in the work area to select it.
3. Drag the selected expression to the Graph window.

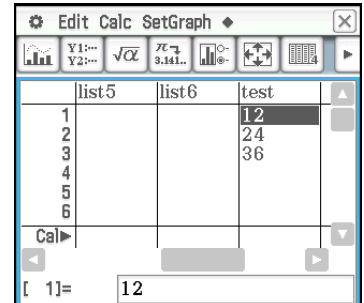
**0240**

1. On the work area window, tap  to display the Stat Editor window in the lower window.
2. In the Stat Editor window, input {1, 2, 3} into “list1” and {4, 5, 6} into “list2”.
3. Make the work area window active, press **Keyboard**, and then perform the following calculation: list1 + list2 ⇒ list3.
4. Press **Keyboard** to hide the keyboard.
 - Here you can see that list3 contains the result of list1 + list2.



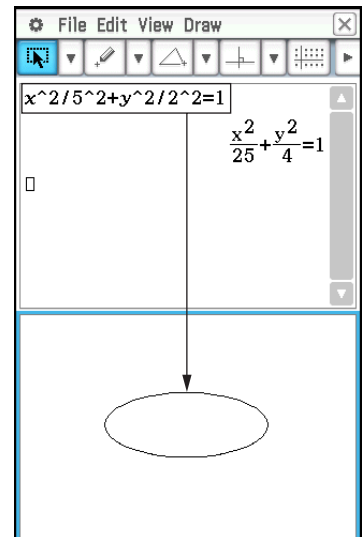
0241

1. Tap the Main application work area window to make it active.
2. Perform the operation $\{12, 24, 36\} \Rightarrow \text{test}$, which assigns the list data $\{12, 24, 36\}$ to the LIST variable named "test".
3. Tap the Stat Editor window to make it active, and then use \blacktriangleright key to scroll the screen to the right until the blank list to the right of "list6" is visible.
4. Tap the blank cell next to "list6", input "test", and then tap $\boxed{\text{EXE}}$.
 - This displays the list data $\{12, 24, 36\}$, which is assigned to the variable named "test".

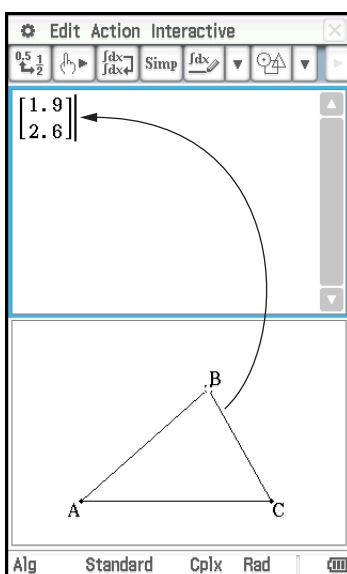


0242

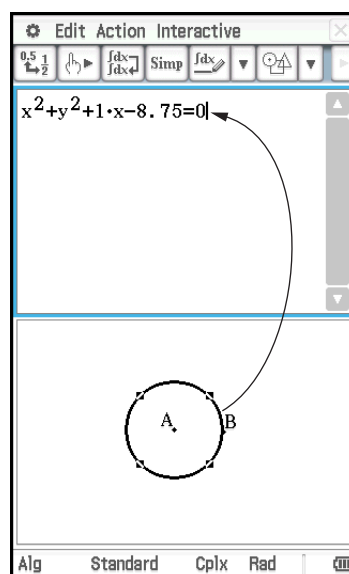
1. Input the expression $x^2/5^2 + y^2/2^2 = 1$ in the work area.
2. Tap \square to display the Geometry window in the lower window.
3. Drag the stylus across the expression in the work area to select it, and then drag the selected expression to the Geometry window.
 - An ellipse appears in the Geometry window.



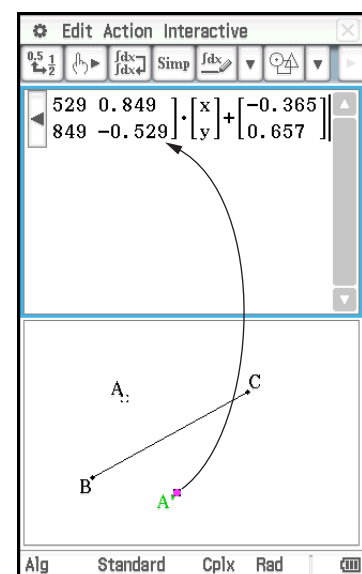
0243



Point



Circle



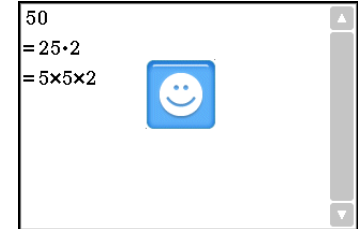
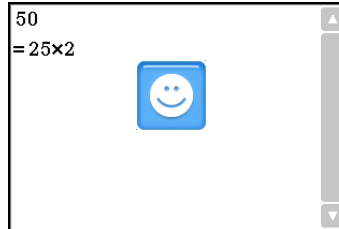
A point and its image

0244

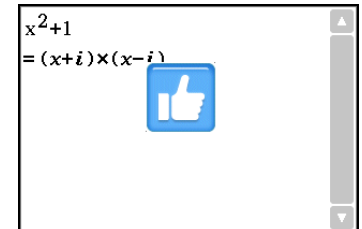
1. Start up Verify.
2. Input 50 and press **[EXE]**.
3. Following the equal sign (=), input 25×3 and press **[EXE]**.
4. Tap [OK] to close the error dialog that appears.



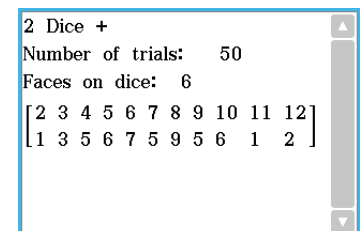
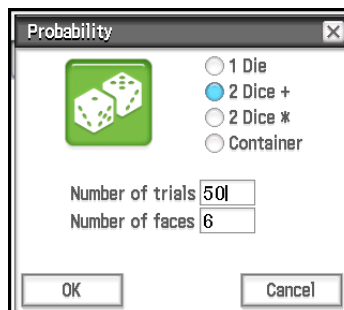
5. Change 25×3 to 25×2 and press **[EXE]**.
6. Following the next equal sign (=), input $5 \times 5 \times 2$ and press **[EXE]**.

**0245**

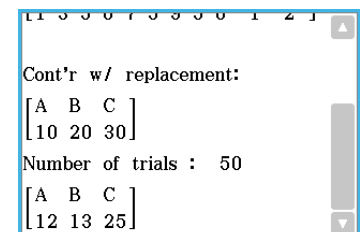
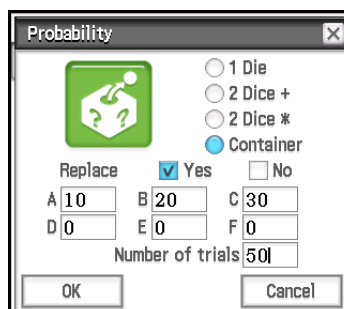
1. Tap **[C]** and then tap [OK] to clear the window.
2. Tap the down arrow on the toolbar and select **[C]**.
3. Input $x^2 + 1$ and press **[EXE]**.
4. Input $(x + i)(x - i)$ and press **[EXE]**.

**0246**

1. Start up Probability, and then select “2 Dice +”.
2. Enter 50 into the “Number of trials” box.
3. Tap [OK] to display the result in the Probability window.

**0247**

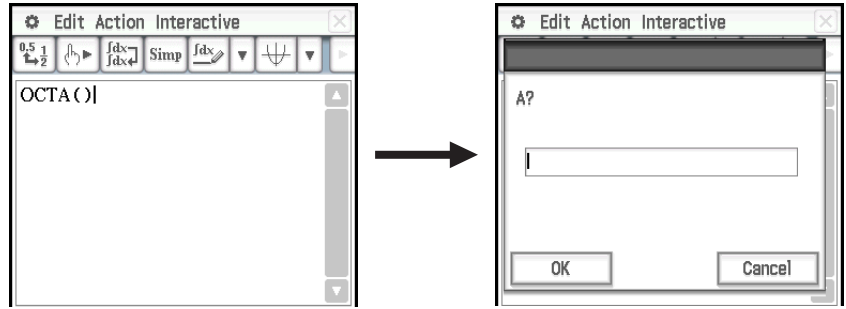
1. Tap **[C]** to display the Probability dialog box, and then select “Container”.
2. Configure the following settings on the dialog box.
Replace: Yes*, A: 10, B: 20, C: 30
(Leave other letters set to zero.),
Number of trials: 50
3. Tap [OK].



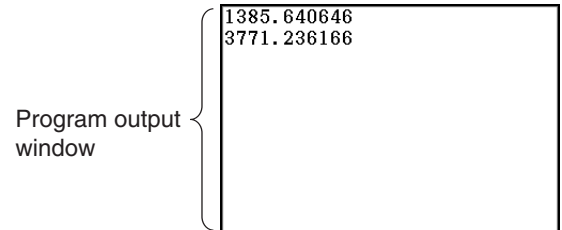
* Indicates the ball is replaced before the next draw. If the ball is not replaced, select “No”.

0248

1.




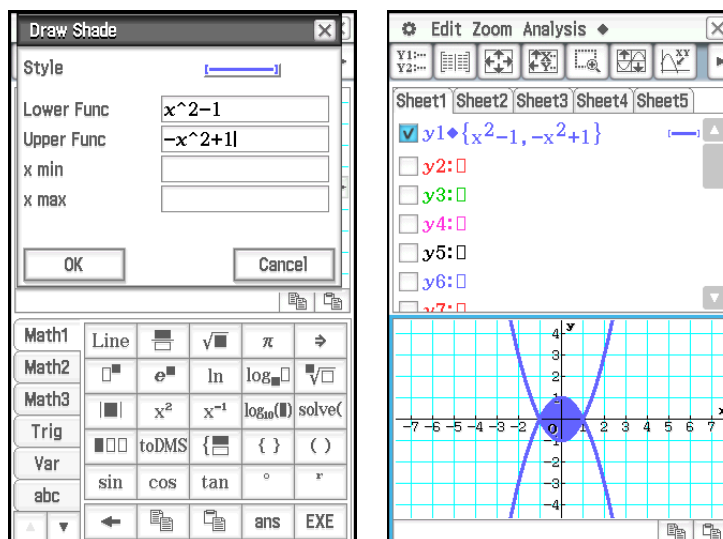
2. Enter 20 and then tap [OK].
- This will run OCTA and display the results in the program output window.







Chapter 3: Graph & Table Application

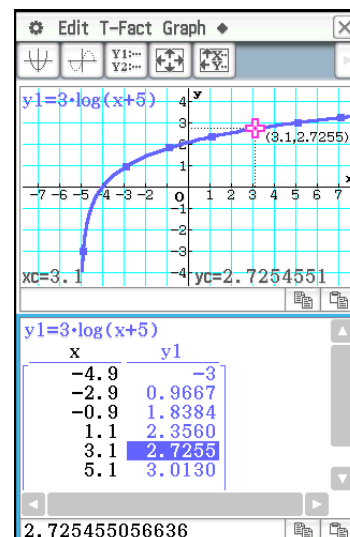
0301

1. On the  menu, tap [Draw Shade].
2. On the dialog box that appears, input the following: Lower Func: $x^2 - 1$, Upper Func: $-x^2 + 1$. Leave x min and x max blank.
3. Tap [OK].






0302

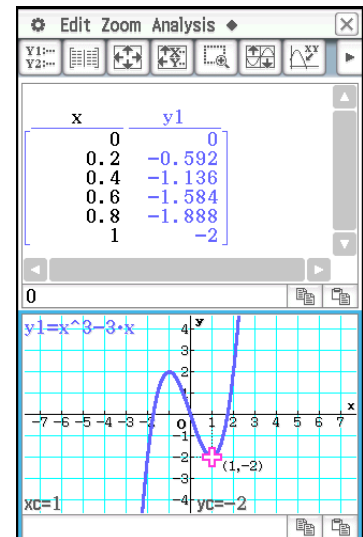
1. Tap  to display the Table Input dialog box, and then configure it with the settings below.
Start: -4.9, End: 7.1, Step: 2
2. On the Graph Editor window, input and store $y = 3\log(x + 5)$ into line y_1 , and then tap .
 - This generates a number table and displays it.
3. Tap  and then [Link].
 - This displays the Graph window and draws the graph, with the trace pointer located on the graph line. The coordinates of the trace pointer location will also be shown.
 - Tapping a cell in the y_1 column causes the trace pointer to move the location of the cell's value.
 - You can move the highlighting in the number table by pressing the up and down cursor keys, or by tapping the cell you want to select. Doing so causes the trace pointer to jump to the corresponding location on the graph.
4. To quit the linked trace operation, tap  on the icon panel.



0303

1. Tap  to display the Table Input dialog box, and then configure it with the following settings.
Start: 0, End: 1, Step: 0.2
2. Input the function $y = x^3 - 3x$ on the Graph Editor window, and then tap  to graph it.
3. Tap  to generate the number table.

- Tap the Graph window to make it active. Next, tap [Analysis] and then [Trace].
 - This causes a pointer to appear on the graph.
- Use the cursor key to move the pointer along the graph until it reaches a point whose coordinates you want to input into the table.
- Press **[EXE]** to input the coordinates at the current cursor position at the end of the table.
- Repeat steps 5 and 6 to input the rest of the coordinates you want.



0304

- In line y1 of the Graph Editor window, input and save $x^2 - x - 2$, and then tap **[Ψ]**.
- Tap [Analysis], [Sketch], and then [Inverse].
 - This graphs the inverse function. The message box briefly shows the inverse function.

Tip: If a function does not have an inverse, the graph produced by the [Inverse] command will be the result of interchanging the x and y variables of the original function.

0305

- While the Graph window is active, tap [Analysis], [Sketch], and then [Circle].
 - This display "Circle" on the Graph window.
- Tap the point where you want the center of the circle to be, and then tap a second point anywhere on the circle's circumference.
 - This draws the circle, and the message box shows the function for the circle.
 - You can also draw a circle by specifying the coordinates of its center point and specifying its radius value. In place of the operation in step 2 of the above procedure, press a number key on the keypad. On the dialog box that appears, enter the required values and then tap [OK].

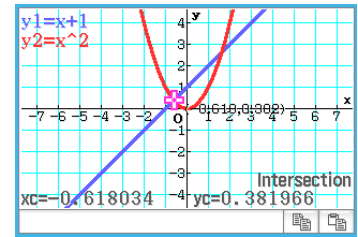
0306

- While the Graph window is active, tap [Analysis], [Sketch], and then [Vertical].
 - This display "Vertical" on the Graph window.
- Press **[2]**.
 - This displays a dialog box for specifying the x -coordinate of the vertical line, with 2 specified as the x -coordinate.
 - Instead of inputting a value here, you can use the stylus to tap the point through which the vertical line should pass.
- Tap [OK].

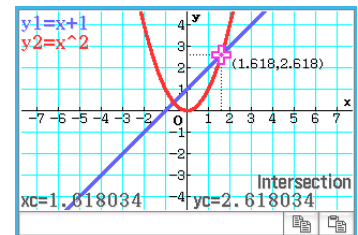
To draw a horizontal line, tap [Analysis], [Sketch], and then [Horizontal] in place of [Vertical] in step 1 of the above procedure. In the case of a horizontal line, you need to specify the y -coordinate in step 2.

0307

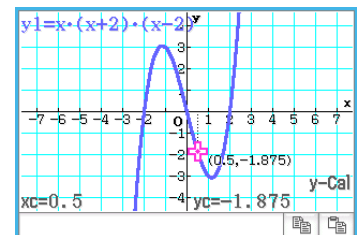
- On the Graph Editor window, input and store $y = x + 1$ into line y_1 and $y = x^2$ into y_2 , and then tap \square to graph them.
- Tap [Analysis], [G-Solve], and then [Intersection].
 - This causes “Intersection” to appear on the Graph window, with a pointer located at the point of intersection. The x - and y -coordinates at the current pointer location are also shown on the Graph window.



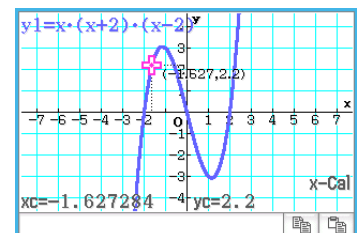
- To obtain other points of intersection, press the left or right cursor key, or tap the left or right graph controller arrows.

**0308**

- On the Graph Editor window, input and store $y = x(x + 2)(x - 2)$ into line y_1 , and then tap \square to graph it.
- To obtain the value of y for a particular x -value, tap [Analysis], [G-Solve], [x -Cal/ y -Cal], and then [y -Cal].
 - This displays a dialog box for specifying the x -value.
- For this example, input 0.5 and then tap [OK].
 - This moves the pointer to the location on the graph where $x = 0.5$, and displays the x -coordinate and y -coordinate at that location.



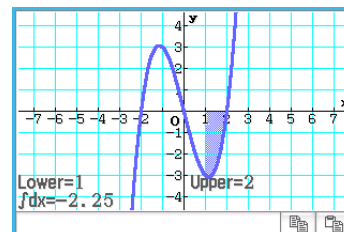
- To obtain the value of x for a particular y -value, tap [Analysis], [G-Solve], [x -Cal/ y -Cal], and then [x -Cal].
 - This displays a dialog box for specifying the y -value.
- For this example, input 2.2 and then tap [OK].
 - This moves the pointer to the location on the graph where $y = 2.2$, and displays the x -coordinate and y -coordinate at that location.



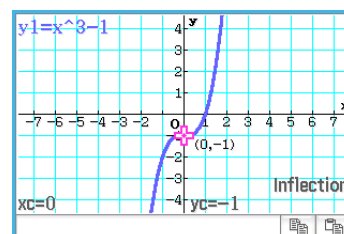
Tip: When there are multiple results for the above procedure, press \blacktriangleright to calculate the next value. Pressing \blacktriangleleft returns to the previous value.

0309

1. On the Graph Editor window, input and store $y = x(x + 2)(x - 2)$ into line y_1 , and then tap Ψ to graph it.
2. Tap [Analysis], [G-Solve], [Integral], and then $\int dx$.
 - This displays “Lower” on the Graph window.
3. Press $\boxed{1}$.
 - This displays a dialog box for inputting an interval for the x -values, with 1 specified for the lower limit of the x -axis (Lower).
4. Tap the [Upper] input box and then input 2 for the upper limit of the x -axis.
5. Tap [OK].

**0310**

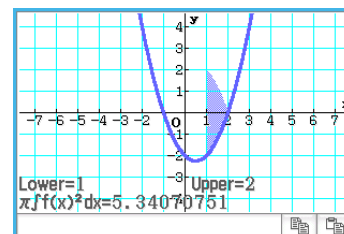
1. On the Graph Editor window, input and store $y = x^3 - 1$ into line y_1 , and then tap Ψ to graph it.
2. Tap [Analysis], [G-Solve], and then [Inflection].
 - This causes “Inflection” to appear on the Graph window, with a pointer located at the point of inflection.



Tip: If your function has multiple inflection points, use the cursor keys or graph controller arrows to move the pointer between them and display their coordinates.

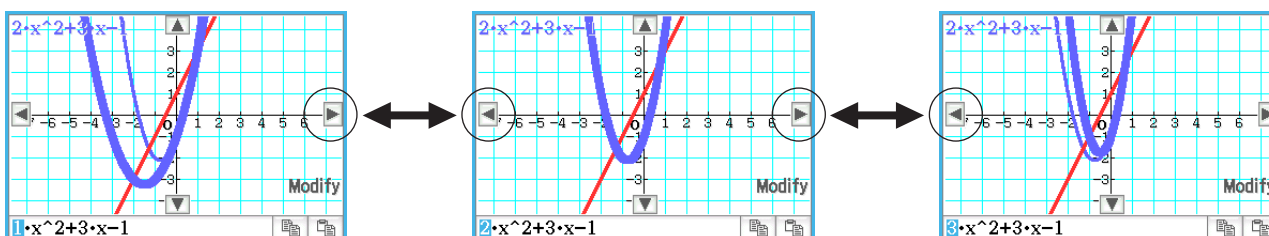
0311

1. On the Graph Editor window, input and store $y = x^2 - x - 2$ into line y_1 , and then tap Ψ to graph it.
2. Tap [Analysis], [G-Solve], and then $\pi \int f(x)^2 dx$.
 - This displays a crosshair pointer on the graph, and the word “Lower” in the lower right corner of the Graph window.
3. Press $\boxed{1}$.
 - This displays a dialog box for inputting an interval of values for x , with 1 specified for the lower limit of the x -axis (Lower).
4. Tap the [Upper] input box and then input 2 for the upper limit of the x -axis.
5. Tap [OK].
 - This causes a silhouette of the solid of revolution to appear on the Graph window, and its volume to appear in the message box.

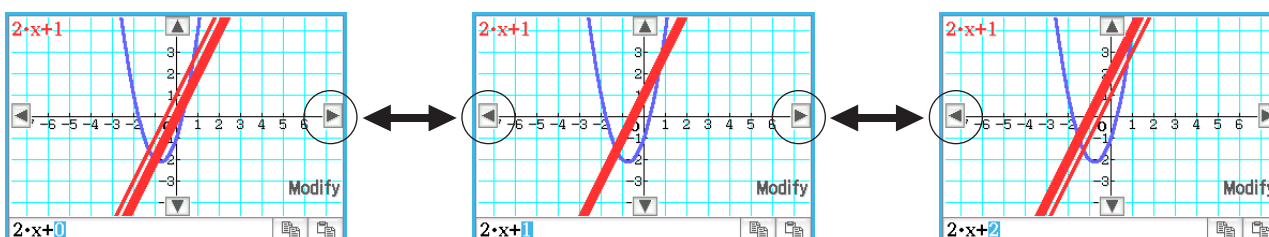


0312

- If the graph controller is not displayed on the Graph window, perform the operation below.
 - Tap and then [Graph Format] to display the Graph Format dialog box.
 - Select the “G-Controller” check box.
 - Tap [Set].
- On the Graph Editor window, input $2x^2 + 3x - 1$ in line y1, and $2x + 1$ in line y2.
- Tap to graph the function.
- Tap [Analysis] and then [Modify].
 - This displays a dialog box for inputting the step.
- Input the amount of change (step) in the parameter value, and then tap [OK].
 - This causes “Modify” to appear on the Graph window and the y1 graph ($2x^2 + 3x - 1$) to become active, which is indicated by a thick graph line.
 - The function of the currently active graph is displayed in the Graph window message box.
- In the function displayed in the message box, select the parameter you want to change.
- Tap the left or right graph controller button to change the value of the parameter you selected in step 5.
 - To increase the value of the parameter, tap the right graph controller arrow.
 - To decrease the value of the parameter, tap the left graph controller arrow.



- At this point, you could select other parameters and change their values as well, if you want.
- To modify the y2 graph ($2x + 1$), tap the down graph controller arrow to make it the graph active.
 - Repeat steps 6 and 7 to modify the currently selected graph.



- To quit graph modification, tap on the icon panel.

0313

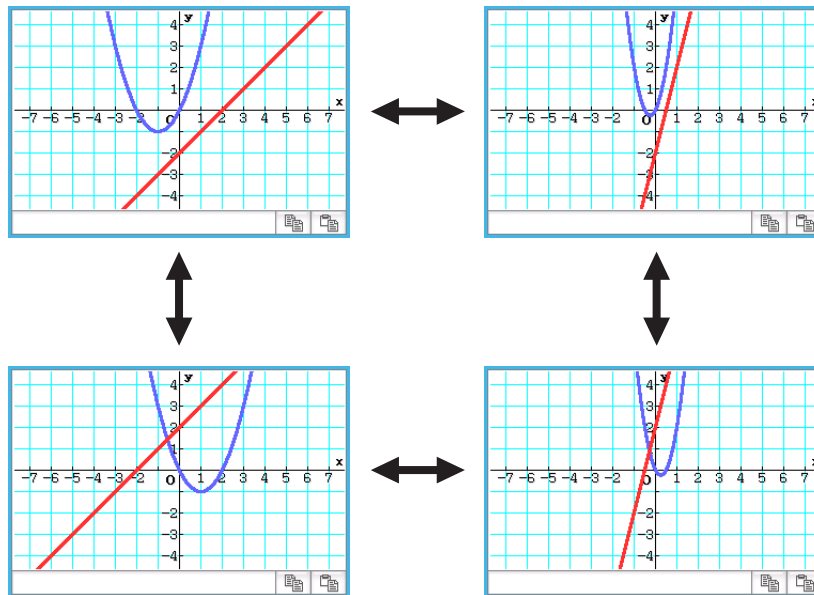
- On the Graph Editor window, input $ax^2 - bx$ in line y1, and $ax + b$ in line y2.
- Tap and then [Dynamic Graph] or tap .
- On the menu that appears when you tap the upper left corner of the slider display box, tap [Settings].
- On the Slider Settings dialog box that appears, use the [Slider 1] and [Slider 2] tabs to input the values shown in the table below for the minimum values, maximum values, and step values of parameters a and b .

Tab	Parameter	Min	Max	Step
[Slider 1]	a	1	4	1
[Slider 2]	b	-2	2	1

- Tap [OK] to close the dialog box.

6. Modify the graphs by changing the value of parameter a or b .

- To change parameter a and b values, tap the ◀ or ▶ buttons to increase or decrease the value by the Step value, or tap the upper left corner of the slider display box and then tap [Auto Play] on the menu that appears.



- If you tapped [Auto Play], tap Esc or press **Clear** to stop graph form modification.

Chapter 4: Conics Application

0401

- On the Conics Editor window, tap to display the Select Conics Form dialog box.
- Select " $x = A(y - K)^2 + H$ " and then tap [OK].
 - This inputs " $x = A(y - K)^2 + H$ " in the Conics Editor window.

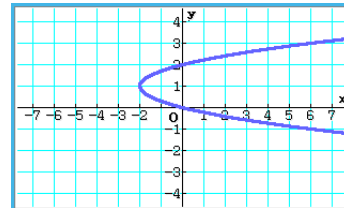
Conics Equation:

$$x = A \cdot (y - K)^2 + H$$

- Change the parameters of the equation as follows: $A = 2$, $K = 1$, $H = -2$.
- Tap to graph the equation.

Conics Equation:

$$x = 2 \cdot (y - 1)^2 - 2$$



0402

- On the Conics Editor window, input the equation $\frac{(x - 1)^2}{2^2} + (y - 2)^2 = \frac{x^2}{4}$.

Conics Equation:

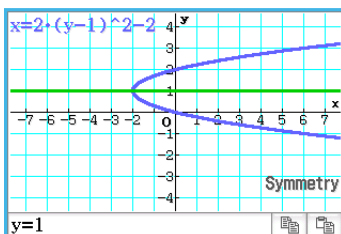
$$\frac{(x - 1)^2}{2^2} + (y - 2)^2 = \frac{x^2}{4}$$

- Tap to display the Select Conics Form dialog box, select " $x = Ay^2 + By + C$ ", and then tap [OK].
 - This transforms the equation to the form you selected.

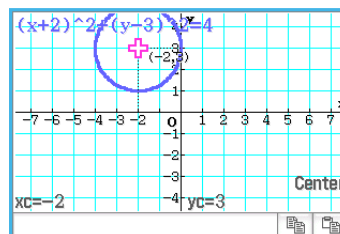
Conics Equation:

$$x = 2 \cdot y^2 - 8 \cdot y + \frac{17}{2}$$

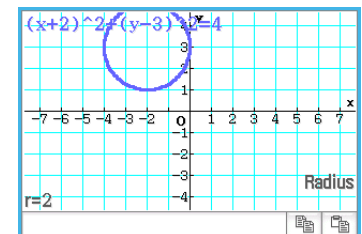
0403 Symmetry



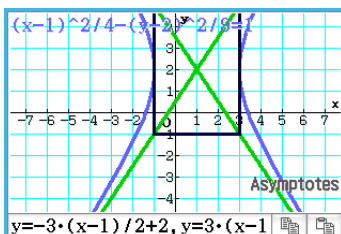
0404 Center



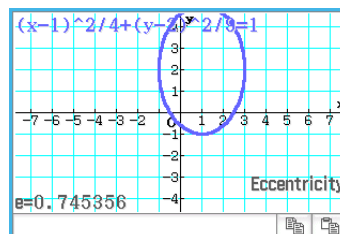
0405 Radius



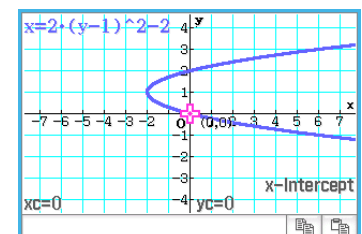
0406 Asymptotes





0407 Eccentricity





0408 x-Intercept

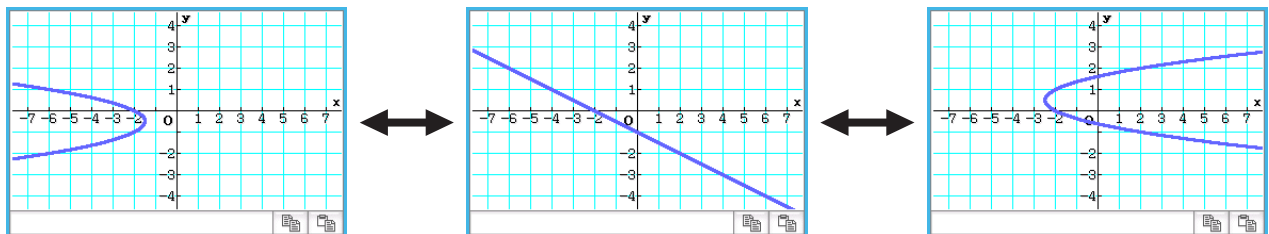



0409

1. On the Conics Editor window, tap  to display the Select Conics Form dialog box.
2. Select " $x = Ay^2 + By + C$ " and then tap [OK].
 - This inputs " $x = A \cdot y^2 + B \cdot y + C$ " in the Conics Editor window.
3. Tap .
 - This will display sliders for changing values assigned to parameters A, B, and C.
4. On the menu that appears when you tap the upper left corner of the slider display box, tap [Settings].
5. On the Slider Settings dialog box that appears, use the [Slider 1], [Slider 2], and [Slider 3] tabs to input the values shown below for the settings of parameters A, B, and C.

Value: -2, Min: -2, Max: 2, Step: 1

6. Tap [OK] to close the dialog box.
7. Modify the graphs by changing the value of parameter A, B, or C.
 - Use the  and  buttons of the A, B, and C sliders to change the value assigned to increase or decrease the value assigned to each parameter by the Step value.



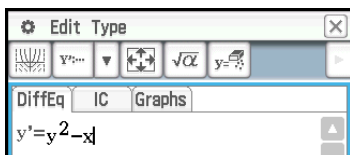
- Tapping the upper left corner of the slider display box and then tapping [Auto Play] on the menu that appears will automatically cycle the value assigned to the applicable parameter between its minimum and maximum values.
(Simultaneous execution of multiple parameters with Auto Play is not supported.)
8. To quit graph modification, tap the close button () in the upper right corner of the slider display box.

Chapter 5: Differential Equation Graph Application

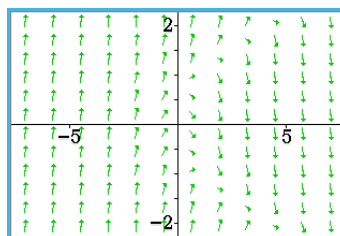
0501

1. On the Differential Equation Editor window, tap [Type] - [1st (Slope Field)] or $y' = \dots$.

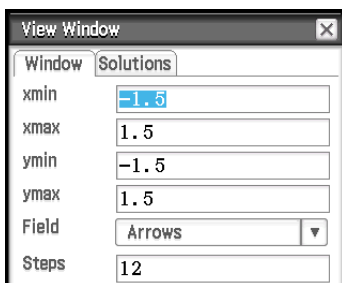
2. $\sqrt{\quad}$ \wedge 2 $-$ ∞ EXE



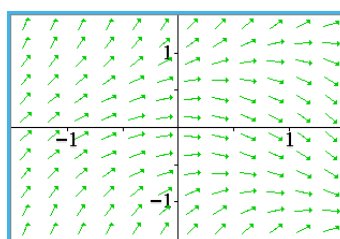
3. Tap Field to draw the slope field.



4. Tap View Window , and configure the View Window settings as shown below.



5. Tap [OK].



This updates the slope field in accordance with the new View Window settings.

0502

1. Activate the Differential Equation Editor window and then tap the [IC] tab.

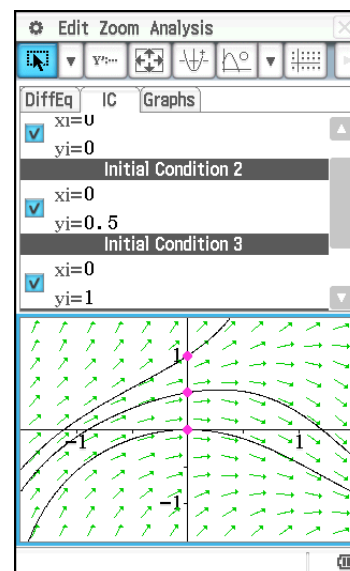
- This displays the initial condition editor.

2. On the initial condition editor, input the following initial conditions:

$(x_i, y_i) = (0, 0), (0, 0.5), (0, 1)$.

3. Tap Graphs .

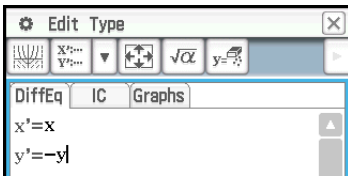
- This graphs the three solution curves over the slope field of $y' = y^2 - x$.




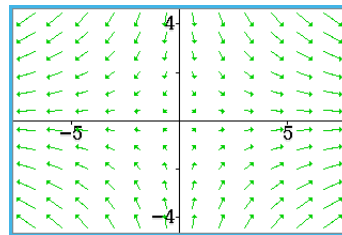
0503

1. On the Differential Equation Editor window, tap [Type] - [2nd (Phase Plane)] or .

2.    



3. Tap  to draw the phase plane.



0504

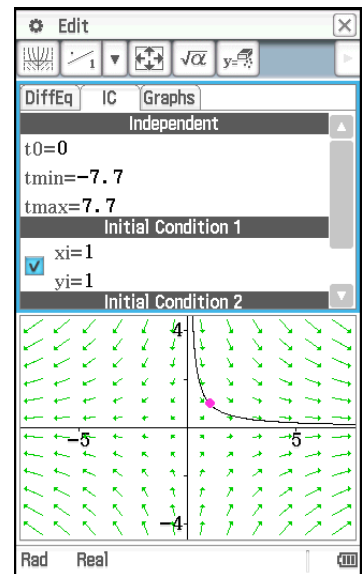
1. Activate the Differential Equation Editor window and then tap the [IC] tab.

- This displays the initial condition editor.

2. Input $(x_i, y_i) = (1, 1)$ on the initial condition editor.

3. Tap .




- This graphs the solution curve and overlays it on the phase plane of $x' = x$, $y' = -y$.








0505

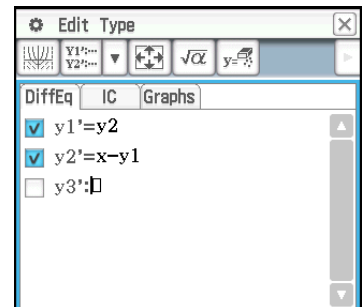
1. On the Differential Equation Editor window, tap [Type] - [Nth (No Field)] or .

2. Input $y''' = x - y$ by dividing it into two first order differential equations. If we let $y_1 = y$ and $y_2 = y'$, we see that $y_1' = y' = y_2$ and $y_2' = y'' = x - y_1$.

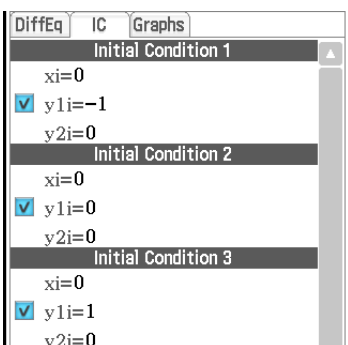
  

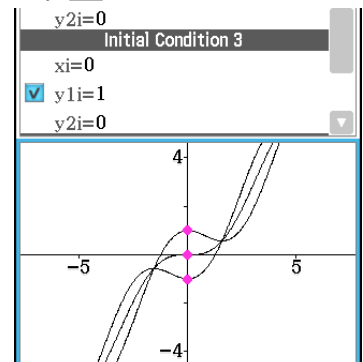
3. Tap the [IC] tab to display the initial condition editor.




4. Input $(x_i, y1_i, y2_i) = (0, -1, 0), (0, 0, 0), (0, 1, 0)$.

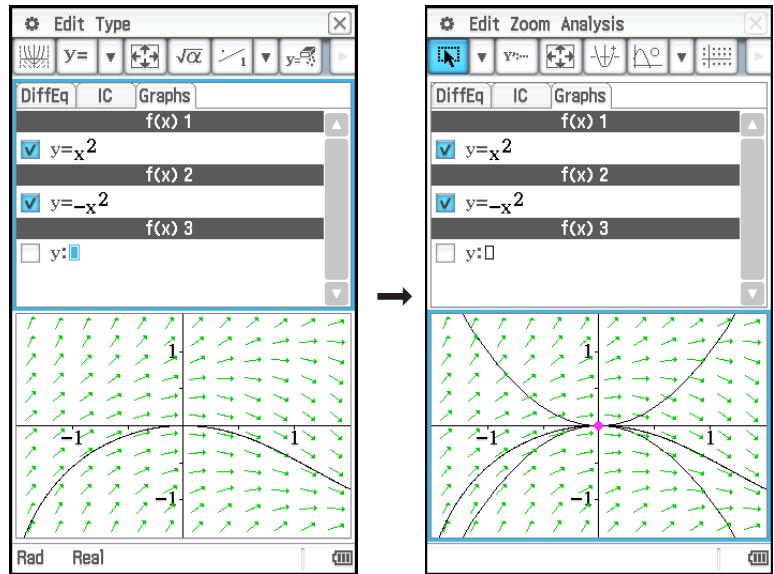



5. Tap .

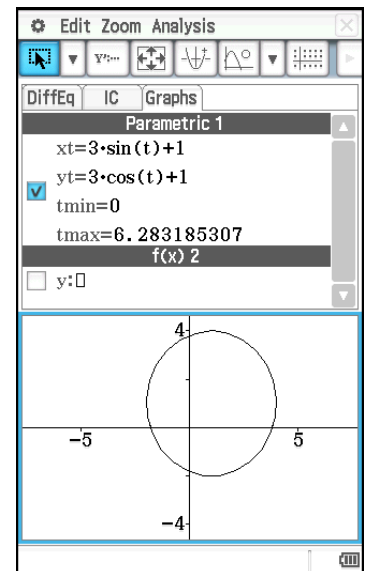


0506

1. On the Differential Equation Editor window, tap the [Graphs] tab.
2. Tap [Type] - [$f(x)$] or $y=$, and then input $y = x^2$ and $y = -x^2$.
3. Tap .
 - This will overlay the graphs of $y = x^2$ and $y = -x^2$ on the differential equation graph.

**0507**

1. On the Differential Equation Editor window, tap the [Graphs] tab.
2. Confirm that “Rad” is displayed as the angle unit setting on the left side of the status bar. If it isn’t, tap the angle setting until “Rad” is displayed.
3. Tap [Type] - [Parametric] or $x(t)=$, and then input the expression for the graph $xt = 3\sin(t) + 1$ and $yt = 3\cos(t) + 1$, and $0 \leq t \leq 2\pi$ for the range of t .
4. Tap  to draw the graph.
 - To adjust the graph window, tap [Zoom] and then [Quick Initialize].

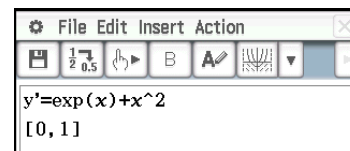


0508

1. Start up the eActivity application and input the following expression and matrix.

$$y' = \exp(x) + x^2$$

$$[0, 1]$$



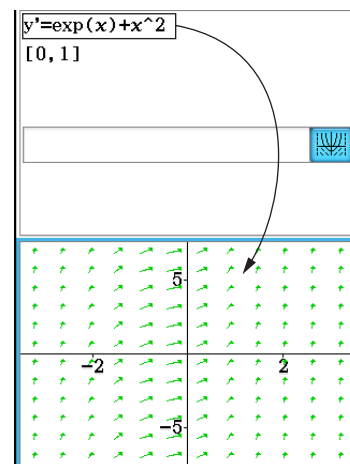
2. From the eActivity application menu, tap [Insert], [Strip(2)], and then [DiffEqGraph].

- This inserts a Differential Equation Graph data strip, and displays the Differential Equation Graph window in the lower half of the screen.

3. Drag the stylus across “ $y' = \exp(x) + x^2$ ” on the eActivity application window to select it.

4. Drag the selected expression to the Differential Equation Graph window.

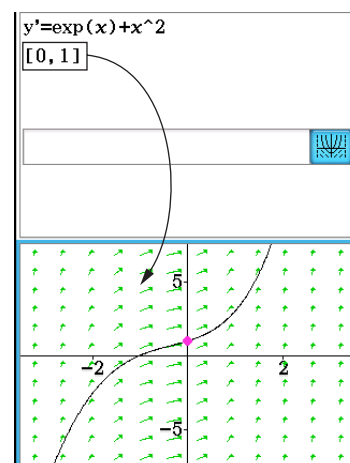
- This draws the slope field of $y' = \exp(x) + x^2$ and registers the equation in the differential equation editor ([DiffEq] tab).



5. Drag the stylus across “[0,1]” on the eActivity application window to select it.

6. Drag the selected matrix to the Differential Equation Graph window.

- This graphs the solution curve of $y' = \exp(x) + x^2$ in accordance with the initial condition defined by the matrix and registers the initial condition in the initial condition editor ([IC] tab).

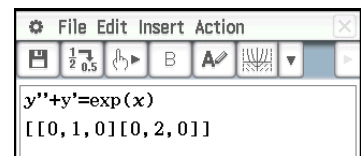


0509

1. Start up the eActivity application and input the following expression and matrix.

$$y'' + y' = \exp(x)$$

$$[[0,1,0][0,2,0]]$$



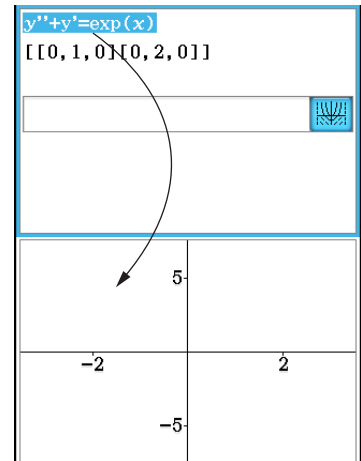
2. From the eActivity application menu, tap [Insert], [Strip(2)], and then [DiffEqGraph].

- This inserts a Differential Equation Graph data strip, and displays the Differential Equation Graph window in the lower half of the screen.

3. Drag the stylus across “ $y'' + y' = \exp(x)$ ” on the eActivity application window to select it.

4. Drag the selected expression to the Differential Equation Graph window.

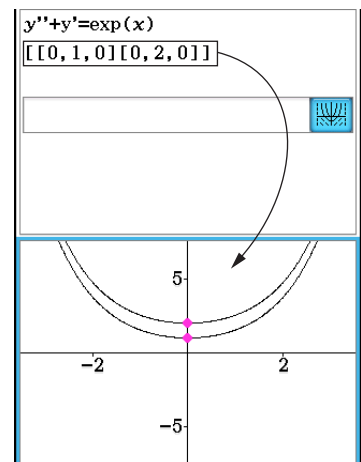
- This registers $y'' + y' = \exp(x)$ on the differential equation editor ([DiffEq] tab). The Differential Equation Graph window contents do not change at this time.



5. Drag the stylus across “[0,1,0][0,2,0]” on the eActivity application window to select it.




6. Drag the selected matrix to the Differential Equation Graph window.

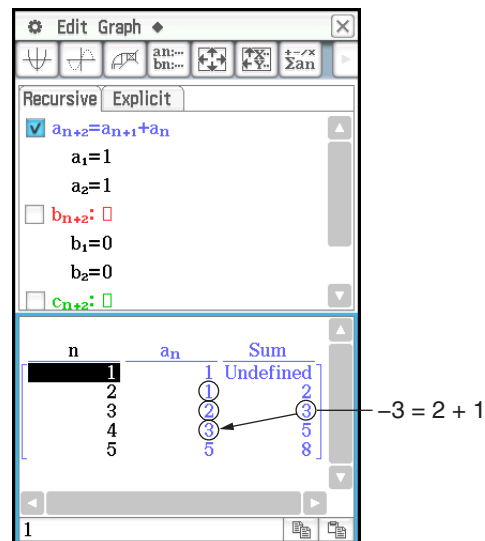
- This graphs the solution curves of $y'' + y' = \exp(x)$ in accordance with the initial condition defined by the matrix, and registers the initial condition in the initial condition editor ([IC] tab).





Chapter 6: Sequence Application

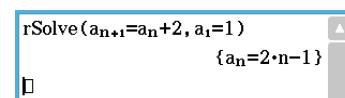
0601

1. On the Sequence Editor window, tap the [Recursive] tab.
2. Tap [Type] - [a_{n+2} Type a_1, a_2].
3. Input the recursion expression $a_{n+2} = a_{n+1} + a_n$ and the initial values $a_1 = 1, a_2 = 1$.
4. Tap  to display the Sequence Table Input dialog box.
5. Input the n -value range as shown below, and then tap [OK].
Start: 1 End: 5
6. Tap the down arrow button next to , and then select  to create the table.





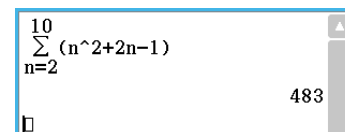
0602

1. On the Sequence Editor window, tap  to display the Sequence RUN window.
2. Tap [Calc] - [rSolve] to input the rSolve function.
3. As the argument of the rSolve function, input the expression " $a_{n+1} = a_n + 2, a_1 = 1$ ".
4. Press .








0603

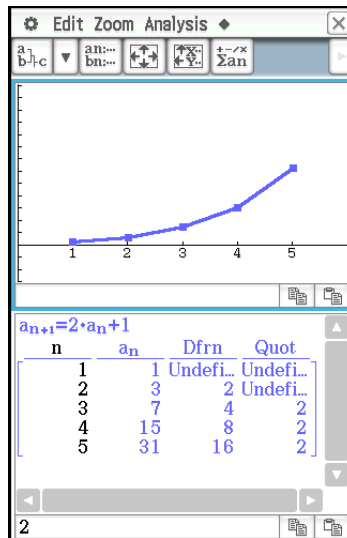
1. On the Sequence Editor window, tap  to display the Sequence RUN window.
2. Tap [Calc] - [Σ] to input the Σ function.
3. As the arguments of the Σ function, specify the range of $n = 2$ to 10 and input the expression " $a_n E = n^2 + 2n - 1$ ".
4. Press .



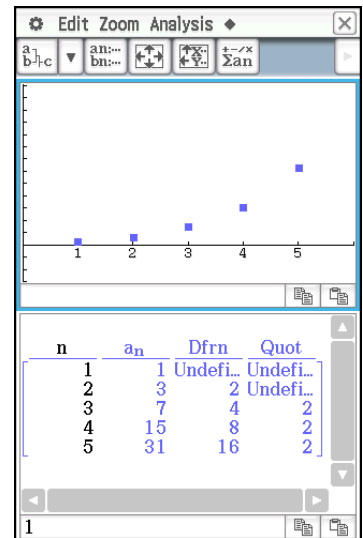
0604

1. On the Sequence Editor window, tap the [Recursive] tab.
2. Tap [Type] - [a_{n+1} Type a_1].
3. Input the recursion expression $a_{n+1} = 2a_n + 1$ and the initial values $a_1 = 1$.
4. Tap the down arrow button next to , and then select  to create the table.
5. Tap , configure View Window settings as shown below, and then tap [OK].
 $x_{\min} = 0$ $x_{\max} = 6$ $x_{\text{scale}} = 1$ x_{dot} : (Specify auto setting.)
 $y_{\min} = -15$ $y_{\max} = 65$ $y_{\text{scale}} = 5$ y_{dot} : (Specify auto setting.)
6. Tap  to draw a connect type graph, or tap  to draw a plot type graph.

In this example, "4 Cells" is selected for the [Cell Width Pattern] setting of the Graph Format dialog box (see "1-7 Configuring Application Format Settings" in the User's Guide).





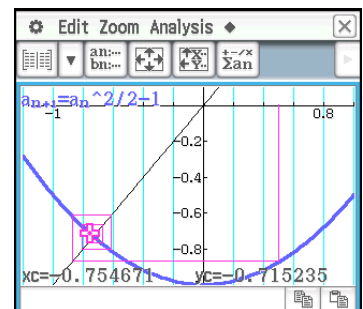
Connect type graph



Plot type graph

0605



1. On the Sequence Editor window, tap the [Recursive] tab.
2. Tap [Type] - [a_{n+1} Type a_1].
3. Input the recursion expression $a_{n+1} = \frac{a_n^2}{2} - 1$ and the initial values $a_1 = 0.5$.
4. Tap the Table window to make it active.
5. Tap , configure View Window settings as shown below, and then tap [OK].
 $x_{\min} = -1.2$ $x_{\max} = 1$ $x_{\text{scale}} = 0.2$
 $y_{\min} = -1$ $y_{\max} = 0.1$ $y_{\text{scale}} = 0.2$
6. Tap  to start drawing a cobweb diagram.
7. Press **[EXE]** for each step of the web.

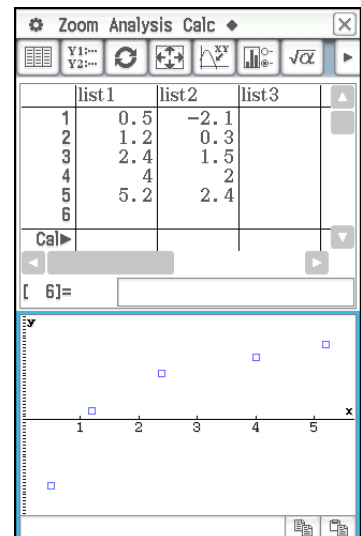
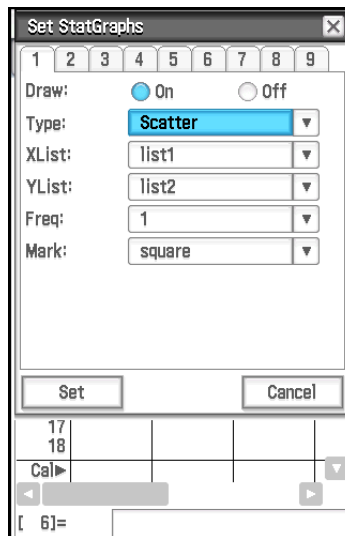


On the cobweb graph window, you can restart drawing of the cobweb diagram by selecting [Trace] on the [Analysis] menu.


Chapter 7: Statistics Application

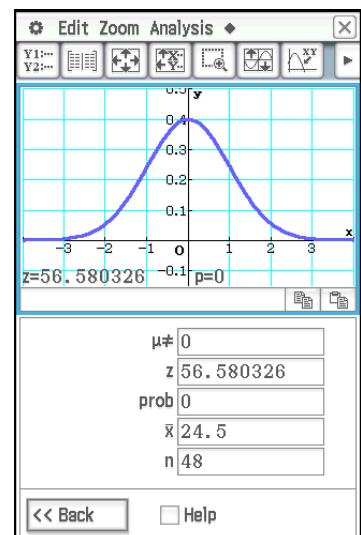
0701

- On the Stat Editor window, input the two lists (list1 = 0.5, 1.2, 2.4, 4.0, 5.2, list2 = -2.1, 0.3, 1.5, 2.0, 2.4).
- Tap  to display the Set StatGraphs dialog box.
- Configure the settings shown in the screen to the right and then tap [Set].
- Tap  to draw the scatter plot.




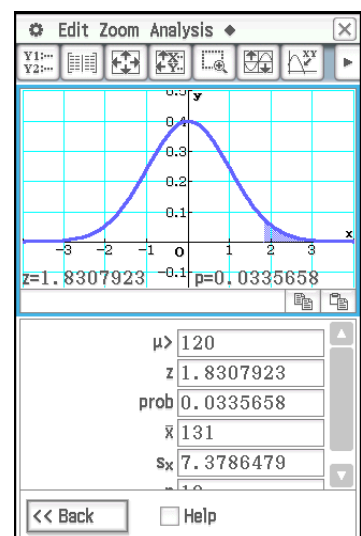
0702

- On the Stat Editor window, tap [Calc] - [Test].
- Select [One-Sample Z-Test] and [Variable], and then tap [Next>>].
- Select the μ condition [\neq] and input values.
 $\mu_0 = 0, \sigma = 3, \bar{x} = 24.5, n = 48$
- Tap [Next>>] to display the calculation results.
- Tap  to graph the results.



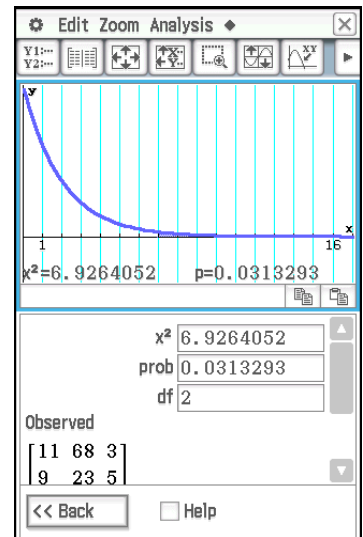
0703

- Input the list data into [list1] and [list2] in the Stat Editor.
list1 = {120,125,130,135,140,145}, list2 = {1,2,4,1,1,1}
- Tap [Calc] - [Test].
- Select [One-Sample Z-Test] and [List], and then tap [Next>>].
- Select the μ condition [$>$] and input values.
 $\mu_0 = 120, \sigma = 19$
- Select List [list1] and Freq [list2].
- Tap [Next>>] to display the calculation results.
- Tap  to graph the results.



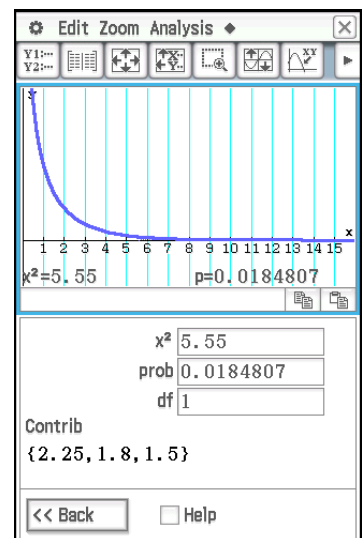
0704

1. On the Stat Editor window, tap $\sqrt{\alpha}$ to display the Main application work area window.
2. Input the matrix $\begin{bmatrix} 11 & 68 & 3 \\ 9 & 23 & 5 \end{bmatrix}$ and assign it to variable a (see “2-5 Matrix and Vector Calculations” in the User’s Guide).
3. Tap the Stat Editor window to make it active.
4. Tap [Calc] - [Test] - [χ^2 Test] and then tap [Next>>].
5. Input “a” in the Matrix dialog box, and then tap [Next>>].
 - This displays the calculation results.
6. Tap Ψ to graph the results.



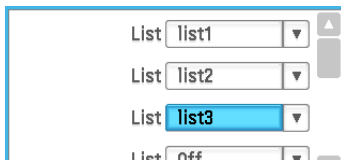
0705

1. On the Stat Editor window, tap $\sqrt{\alpha}$ to display the Main application work area window.
2. Assign {1,2,3} to list1 and {4,5,6} to list2 (see “2-4 List Calculations” in the User’s Guide).
3. Tap the Stat Editor window to make it active.
4. Tap [Calc] - [Test] - [χ^2 GOF Test] and then tap [Next>>].
5. Leaving “Observed” (list1) and “Expected” (list2) at their initial default settings, input 1 for “df”.
6. Tap [Next>>] to display the calculation results.
7. Tap Ψ to graph the results.



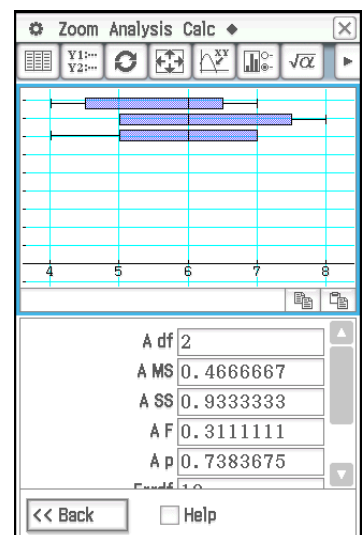
0706

1. Input the list data into [list1], [list2] and [list3] in the Stat Editor.
list1 = {7,4,6,6,5}, list2 = {6,5,5,8,7}, list3 = {4,7,6,7,6}
2. Tap [Calc] - [Test] - [One-Way ANOVA] and then tap [Next>>].
3. Select Lists [list1], [list2], and [list3].



4. Tap [Next>>] to display the calculation results.
5. Tap Ψ to graph the results.

Note: The screen shown nearby is displayed when the [Q₁, Q₃ on Data] check box on the Basic Format dialog box is cleared (unchecked).



0707

1. On the Stat Editor window, tap $\sqrt{\alpha}$ to display the Main application work area window.
2. Assign {113,116} to list1, {139,132} to list2, {133,131} to list3, and {126,122} to list4 (see “2-4 List Calculations” in the User’s Guide).
3. Tap the Stat Editor window to make it active.
4. Tap [Calc] - [Test] - [Two-Way ANOVA] and then tap [Next>>].
5. Select “2 x 2” as the dimensions of the ANOVA data table, and then tap [Next>>].
6. Assign list1 for (1,1), list2 for (1,2), list3 for (2,1), and list4 for (2,2), and then tap [Next>>].
 - This displays the calculation results.
 - The results indicate that altering the time is not significant, altering the temperature is significant, and interaction between time and temperature is highly significant.

0708

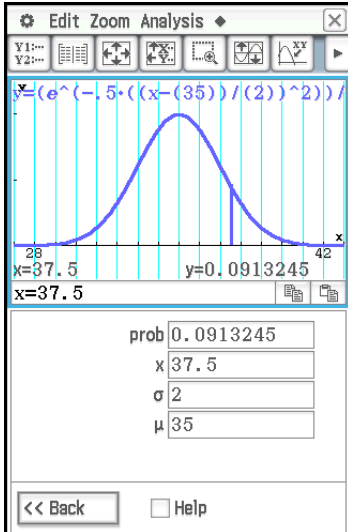
1. Input the data {299.4, 297.7, 301, 298.9, 300.2, 297} into [list1] in the Stat Editor.
2. Tap [Calc] and then [Interval].
3. Select [One-Sample Z Int] and [List], and then tap [Next>>].
4. Input the values (C-Level = 0.95, $\sigma = 3$).
5. Select List [list1] and Freq [1].
6. Tap [Next >>] to display the calculation results.

0709 to 0714

1. On the Stat Editor window, perform the following operation:
 - 0709: Tap [Calc] - [Distribution] - [Normal PD]
 - 0710: Tap [Calc] - [Distribution] - [Normal CD]
 - 0711: Tap [Calc] - [Inv. Distribution] - [Inverse Normal CD]
 - 0712: Tap [Calc] - [Distribution] - [Poisson PD]
 - 0713: Tap [Calc] - [Distribution] - [Poisson CD]
 - 0714: Tap [Calc] - [Inv. Distribution] - [Inverse Poisson CD]
2. Tap [Next >>], and then input values.
3. Tap [Next >>] to display the calculation results.
4. Tap Ψ to graph the results (except for **0714**).
 - See the next page of this manual for the calculation result and graph screen.

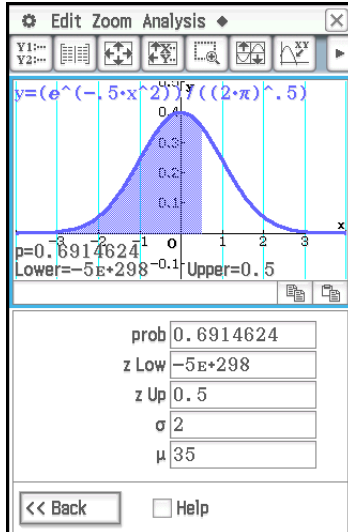
0709 [Normal PD]

x
 σ
 μ



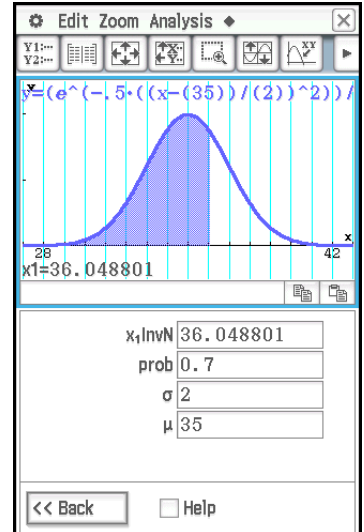
0710 [Normal CD]

Lower
 Upper
 σ
 μ



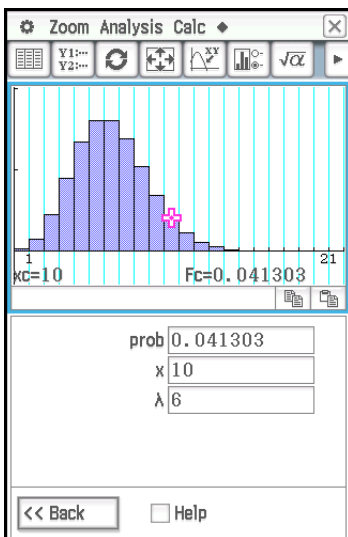
0711 [Inverse Normal CD]

Tail setting
 prob
 σ
 μ



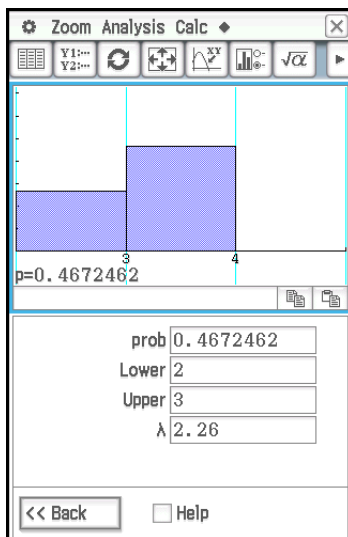
0712 [Poisson PD]

x
 λ



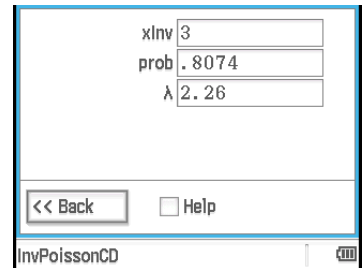
0713 [Poisson CD]

Lower
 Upper
 λ



0714 [Inverse Poisson CD]




prob
 λ

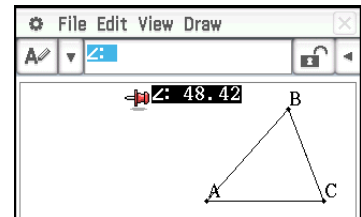
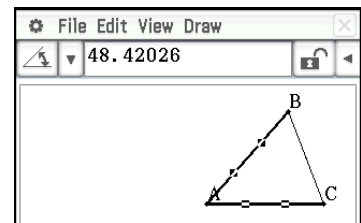


Tip: Graphing the results of one of the following calculations may take a long time when the absolute value of the argument is large: Binomial PD, Binomial CD, Poisson PD, Poisson CD, Geometric PD, Geometric CD, Hypergeometric PD, or Hypergeometric CD calculations.



Chapter 8: Geometry Application

0801

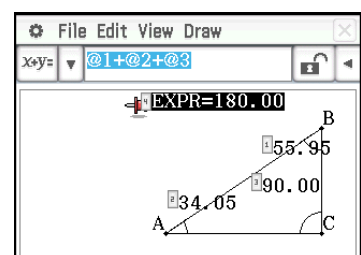
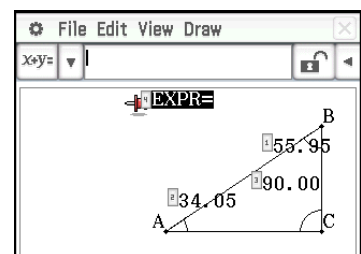
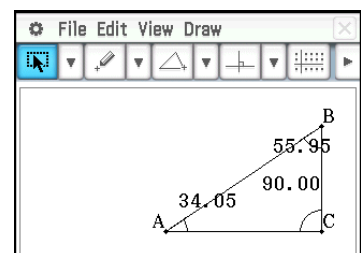
1. Draw the triangle.
2. Tap . Next, tap side AB and then side AC to select them.
3. Tap the  button to the right of the toolbar.
 - This displays the measurement box, which indicates the specified angle.
4. Tap [Draw], [Measurement], and then [Angle].
 - This shows the angle measurement on the screen.
 - You can also perform the operation below in place of step 4.
 - Select (highlight) value in the measurement box and drop it into the Geometry window.
 - Tap the  button on the far left of the measurement box.



0802

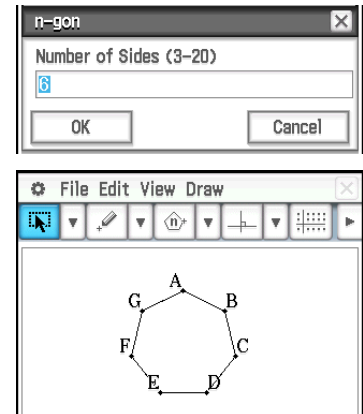
1. Draw a triangle and then display the inside angle value of each angle.
 - For information about displaying angle values, see “To attach an angle measurement to a figure” in the User’s Guide.
2. Tap [Draw] - [Expression].
 - This displays an “EXPR=” object.
3. Tap the  button to the right of the toolbar.
 - This will display the measurement box and also display numeric labels for each measurement currently on the screen.
4. Now you can use the numeric labels to specify measurement values in the calculation you input in the measurement box.
 - To input a measurement value in the measurement box, input the at sign (@) followed by the numeric label of the value. To input value 1 , for example, you would input “@1”.
 - Since we want to calculate the sum of the interior angles of the triangle here, you would input the following: @1+@2+@3.
5. After inputting the calculation expression, press .
 - The calculation result is displayed to the right of “EXPR=”.


Tip: In step 4 above, you also can input the numeric label of a displayed measurement value into the measurement box by tapping the label. Tapping 1 , for example, will input “@1” into the measurement box.

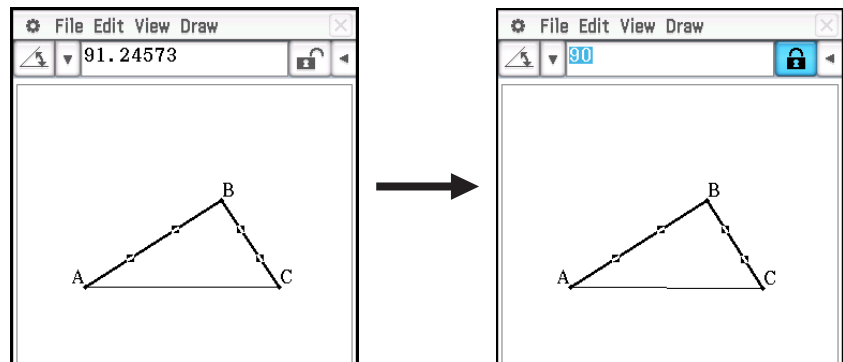




0803

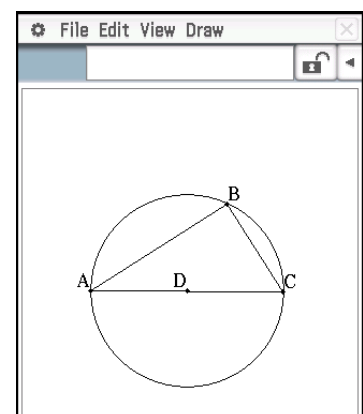
1. Tap [Draw], [Special Polygon], and then [Regular n-gon].
 - This displays the n-gon dialog box.
2. Enter a value indicating the number of sides of the polygon, and then tap [OK].
3. Place the stylus on the screen and drag diagonally in any direction.
 - This causes a selection boundary to appear, indicating the size of the polygon that will be drawn. The polygon is drawn when you release the stylus.

**0804**

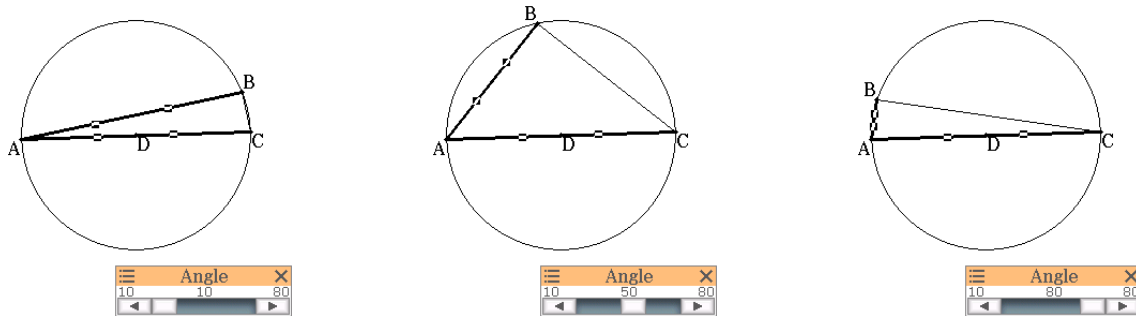
1. Specify “Degree” for the Geometry Format “Measure Angle” (see “1-7 Configuring Application Format Settings” in the User’s Guide).
2. Draw triangle ABC and select sides AB and BC.
3. Tap the  button to the right of the toolbar.
 - This will display the measurement box, which shows the current value of angle B.
4. Input 90 into the measurement box and then press **[EXE]**.
 - This locks the angle B at 90°.



5. Tap in a blank area on the screen to deselect everything and then select the AC side.
 - This displays the measurement box, which shows the length of side AC.
6. Tap .
 - This causes the icon to change to , indicating that the length of AC is locked.
7. Tap the following: [Draw] - [Construct] - [Midpoint].
 - This creates midpoint D on side AC.
8. Tap the following: [Draw] - [Basic Object] - [Circle].
 - This deselects side AC and enters the circle drawing mode.
9. Tap point D and then point B.
 - With point D as the center point, draw a circle that circumscribes triangle ABC.
10. Tap [View] and then [Select].
 - This exits the circle drawing mode and enables selection.
11. Select side AB and side AC, and then tap the following: [Draw] - [Slider] - [Angle].
 - This displays a slider.
12. On the menu that appears when you tap the upper left corner of the slider display box, tap [Settings].



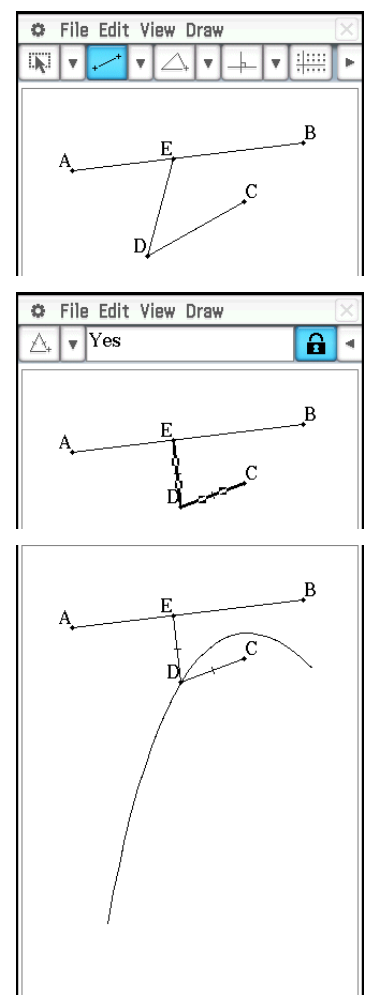
13. On the Slider Setting dialog box that appears, input 10 for **Min**, 80 for **Max**, and 10 for **Step**, and then tap [OK].
14. On the menu that appears when you tap the upper left corner of the slider display box, tap [Auto Play].
 - This causes angle A to change at 10° increments within the range of 10° to 80° . At this time, vertex B moves along the circumference of the circle.



- Instead of tapping [Auto Play], you could also tap the slider ◀ and ▶ buttons to change angle A manually.
15. After you are finished using the slider, tap the close button (X) in the upper right corner of the slider display box.

0805

1. Draw a line segment AB and plot point C, which is not on line segment AB.
2. As shown in the nearby screen, draw line segments DE and DC.
3. Select only line segments AB and DE, and then tap on the toolbar to display the measurement box.
4. Input 90 into the measurement box and press **[EXE]**.
 - This fixes the angle between AB and DE at 90 degrees.
5. Select only line segments DE and DC, and then tap the down arrow next to the measurement box.
6. Tap the icon, and then select the check box to the right of the measurement box.
 - This makes line segments DE and DC congruent in length.
7. Select only point E and line segment AB, and then tap [Edit] - [Animate] - [Add Animation].
8. Select only point D, and then tap [Edit] - [Animate] - [Trace].
 - This should cause a parabola to be traced on the display. Note that line segment AB is the directrix and point C is the focus of the parabola.
9. Tap [Edit], [Animate], and then [Go (once)].



Chapter 9: Numeric Solver Application

0901

1. On the Numeric Solver window, input the equation:

$$h = vt - \frac{1}{2}gt^2$$

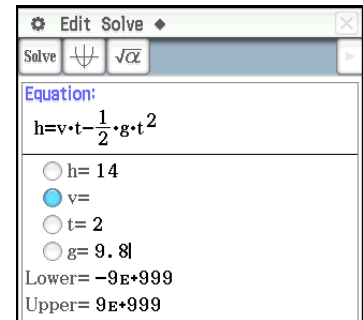
2. On the list of expression variables that appears, enter values for the variables:

$$h = 14, t = 2, \text{ and } g = 9.8.$$

3. Here, we will solve for v , so tap the option button to the left of variable v .

4. Tap **Solve**.

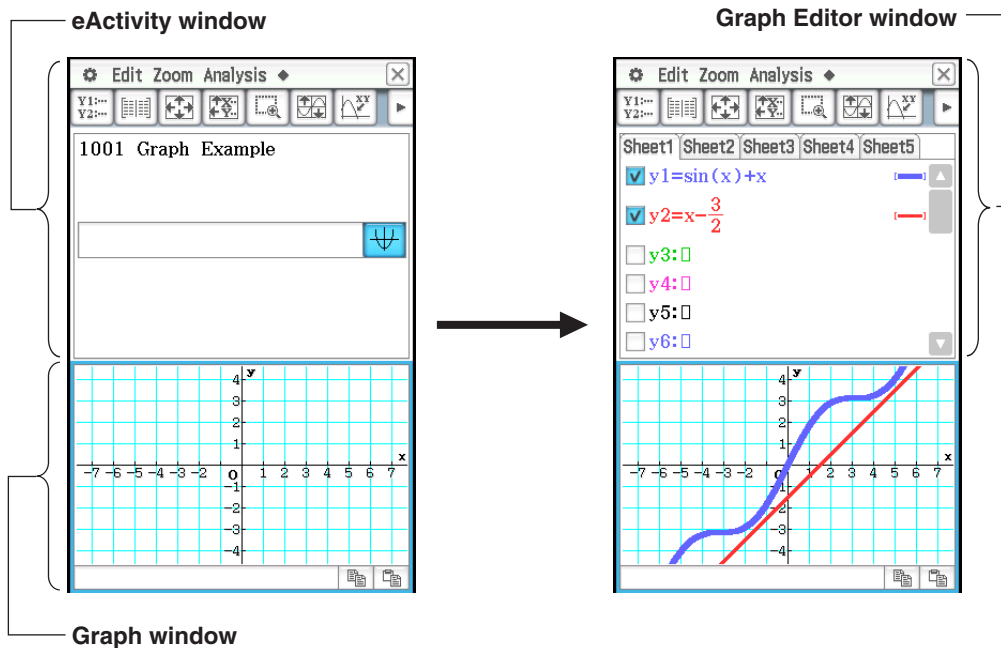
- The [Left–Right] value shows the difference between the left side and right side results.



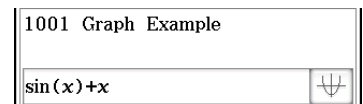
Chapter 10: eActivity Application

1001

- On the eActivity window, tap [Insert], [Strip(1)], and then [Graph].
 - This inserts a Graph strip, and displays the Graph window in the lower half of the screen.
- On the Graph window, tap to display the Graph Editor window.
- Enter functions to graph, and then tap to graph the functions.



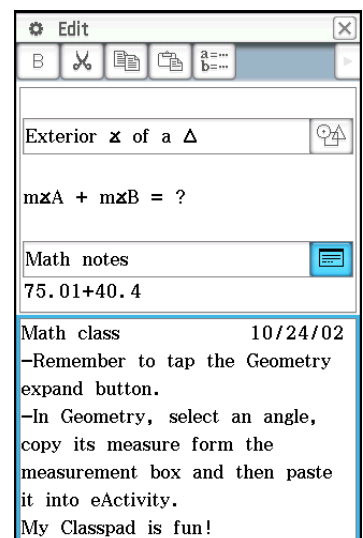
- After you finish performing the operation you want, tap to close the Graph window.
- Tap the Graph Editor window, and then tap to return to the eActivity window.
- Enter the title you want in the Graph strip title box.



1002

- On the eActivity window, tap [Insert], [Strip(1)], and then [Notes].
 - This inserts a Notes strip and displays the Notes window in the lower half of the screen.
- Enter text you want in the Notes window.
- After you finish entering text, you can close the Notes window by tapping .

Tip: The expand button of a data strip is highlighted to indicate that it is expanded in the lower window.



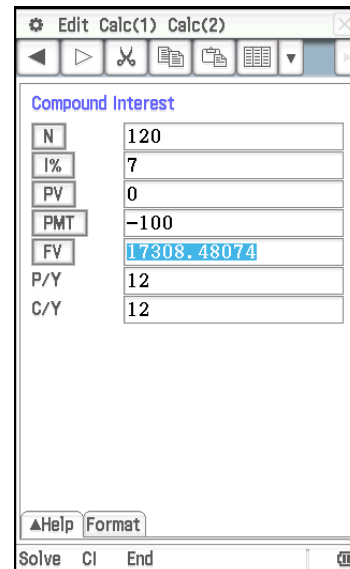
Chapter 11: Financial Application

The operations in the examples below can be started from any Financial application window.

1101 Compound Interest

What will be the value of an ordinary annuity at the end of 10 years if \$100 is deposited each month into an account that earns 7% compounded monthly? Before performing the calculation, change the “Odd Period” setting to “Compound (CI)” and the “Payment Date” to “End of period”.

1. Tap [Calc(1)] - [Compound Interest].
2. Input the values below into the applicable fields
 $N = 120$ (12 months \times 10 years), $I\% = 7$, $PV = 0$,
 $PMT = -100$, $P/Y = 12$ (month), $C/Y = 12$ (month)
3. Tap [FV] to obtain the future value.

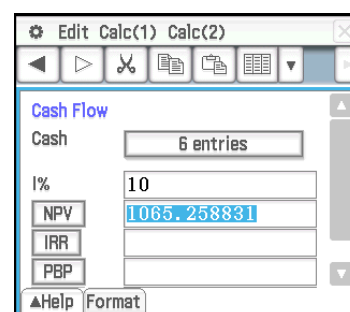


1102 Cash Flow

How much should you be willing to pay (NPV) for an investment with the cash flow values shown in the nearby table, if your required rate of return ($I\%$) is 10% per year?

Period	Cash Flow
0	0
1	100
2	200
3	300
4	400
5	500

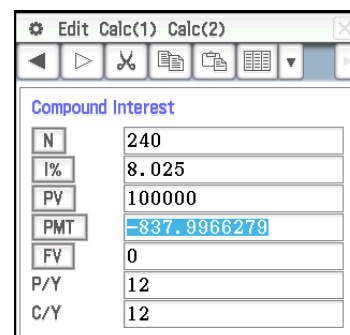
1. Tap to open the Stat Editor window in the lower half of the display.
2. Input the cash flow values in cells 1 through 6 under “list1”.
3. Tap the Cash field (which currently shows “<empty>”).
4. On the dialog box that appears, select “list1” for “List variables”, and then tap [OK].
5. Input 10 into the $I\%$ field.
6. Tap [NPV] to obtain the net present value.



1103 Amortization

In this example, first use a Compound Interest page to calculate the monthly payment of a loan, and then use the result to perform Amortization page calculations. Specify “Compound (CI)” for “Odd Period”, and “End of period” for “Payment Date”.

Page 1 (Compound Interest): Use a Compound Interest page to determine the monthly payment ([PMT]) on a 20-year ($N = 20 \times 12 = 240$) mortgage with a loan amount (PV) of \$100,000 at an annual rate ($I\%$) of 8.025%, compounded monthly ($C/Y = 12$). There are 12 payment periods per year (P/Y). Be sure to input zero for the future value (FV), which indicates that the loan will be completely paid off at the end of 20 years (240 months).

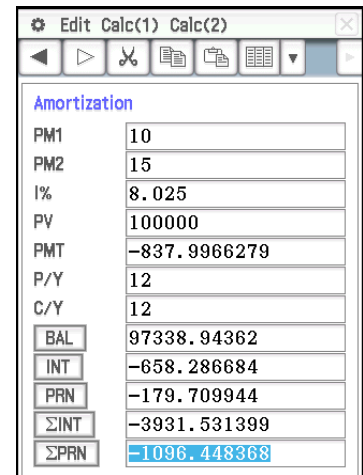


Page 1 calculation results

Page 2 (Amortization): Use the monthly payment value you obtained on Page 1 (PMT = -837.9966279) to determine the following information for payment 10 (PM1) through 15 (PM2).

- The balance (BAL) of the principal remaining after payment 15
- The interest amount (INT) included in payment 10
- The principal amount (PRN) included in payment 10
- Total interest to be paid (Σ INT) from payment 10 to payment 15
- Total principal to be paid (Σ PRN) from payment 10 to payment 15

As on Page 1, the mortgage has a loan amount (PV) of \$100,000 at an annual rate ($I\%$) of 8.025%, compounded monthly ($C/Y = 12$) for 20 years.



Page 2 calculation results

Page 1 (Compound Interest) operations:

1. Tap [Calc(1)] - [Compound Interest].
2. Input the values below into the applicable fields.
N = 240, $I\% = 8.025$, PV = 100000, FV = 0, P/Y = 12, C/Y = 12
3. Tap [PMT] to obtain the payment value.

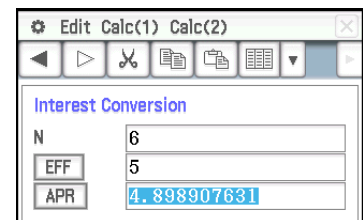
Page 2 (Amortization) operations:

4. Tap [Calc(1)] - [Amortization].
 - PV, $I\%$, and PMT values will automatically be copied from Page 1 to Page 2.
5. Input 10 for PM1 and 15 for PM2.
6. Tap [BAL], [INT], [PRN], [ΣINT], and then [ΣPRN].

1104 Interest Conversion

What is the nominal interest rate ([APR]) on a certificate that offers an annual effective interest rate ([EFF]) of 5%, compounded bi-monthly (N = 6)?

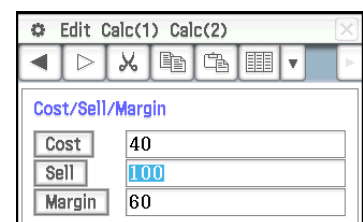
1. Tap [Calc(1)] - [Interest Conversion].
2. Input 6 for N and 5 for EFF.
3. Tap [APR] to obtain the nominal interest rate.



1105 Cost/Sell/Margin

What is the selling price ([Sell]) required to obtain a margin of profit ([Margin]) of 60% on an item that cost \$40 ([Cost])?

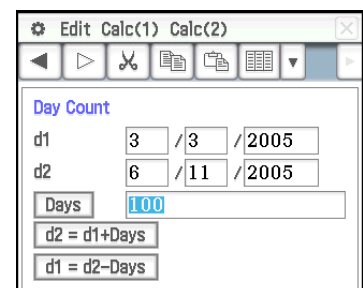
1. Tap [Calc(1)] - [Cost/Sell/Margin].
2. Input 60 for Margin and 40 for Cost.
3. Tap [Sell] to obtain the selling price.



1106 Day Count

How many days ([Days]) are there from March 3, 2005 (d1) to June 11, 2005 (d2)? Be sure to change the "Days in Year" setting to "365 days" before performing a Day Count calculation.

1. Tap [Calc(1)] - [Day Count].
2. Input dates for d1 and d2.
3. Tap [Days] to obtain the number of days.



1107 Depreciation

Use the sum-of-the-years'-digits method ([SYD]) to calculate the first year ($j = 1$) of depreciation on an \$12,000 (PV) computer, with a useful life (N) of five years.

Use a depreciation ratio ($I\%$) of 25%, and assume that the computer can be depreciated for a full 12 months in the first year (YR1). Next, calculate the depreciation amount ([SYD]) for the second year ($j = 2$).

Calculate the depreciation amount for the first year:

1. Tap [Calc(1)] - [Depreciation].
2. Input the values below into the applicable fields.
N = 5 (years), $I\% = 25$, PV = 12000, FV = 0*, $j = 1$, YR1 = 12
3. Tap [SYD].

- This displays the depreciation amount for the first year in the [SYD] field, and the residual value after depreciation for the first year in the RDV field.

Calculate the depreciation amount for the second year:

4. Change the j value to 2, and then tap [SYD].

* At the end of the useful life the value of the computer will be 0, so we enter 0 in the FV field.

Note: You can also tap [SL] to calculate depreciation using straight-line method, [FP] using fixed-percentage method, or [DB] using declining-balance method. Each depreciation method will produce a different residual value after depreciation (RDV) for the applicable year (j).

The screenshot shows the 'Depreciation' calculator interface. The fields are: N=5, I%=25, PV=12000, FV=0, j=1, YR1=12. The [SYD] button is highlighted, and the SYD field displays 4000. The RDV field displays 8000.

N	5
I%	25
PV	12000
FV	0
j	1
YR1	12
[SL]	
[FP]	
[SYD]	4000
[DB]	
RDV	8000

First year

The screenshot shows the 'Depreciation' calculator interface for the second year. The fields are: j=2, YR1=12. The [SYD] button is highlighted, and the SYD field displays 3200. The RDV field displays 4800.

j	2
YR1	12
[SL]	
[FP]	
[SYD]	3200
[DB]	
RDV	4800

Second year

1108 Bond Calculation

You want to purchase a semiannual corporate bond that matures on 12/15/2006 (d2) to settle on 6/1/2004 (d1). The bond is based on the 30/360 day-count method with a coupon rate (CPN) of 3%. The bond will be redeemed at 100% of its par value (RDV). For 4% yield to maturity (YLD), calculate the bond's price ([PRC]) and accrued interest (INT).

Before performing the calculation, change the "Days in Year" setting to "360 days", "Bond Interval" to "Date", and the "Compounding Frequency" to "Semiannual".

1. Tap [Calc(1)] - [Bond Calculation].
2. Input the values below into the applicable fields.
d1 = 6/1/2004, d2 = 12/15/2006, RDV = 100, CPN = 3, YLD = 4
3. Tap [PRC].
 - This displays the bond's price in the [PRC] field, accrued interest in the INT field, and cost of bond in the Cost field.

The screenshot shows the 'Bond Calculation' calculator interface. The fields are: d1=6/1/2004, d2=12/15/2006, N=, RDV=100, CPN=3, [PRC]=-97.60735355, [YLD]=4, INT=-1.383333333, Cost=-98.99068689. The [PRC] button is highlighted.

d1	6	/	1	/	2004
d2	12	/	15	/	2006
N					
RDV	100				
CPN	3				
[PRC]	-97.60735355				
[YLD]	4				
INT	-1.383333333				
Cost	-98.99068689				

1109 Break-Even Point

Your company is producing items with a unit variable cost ([VCU]) of \$50/unit and fixed costs ([FC]) of \$100,000. The items will be sold for a sales price ([PRC]) of \$100/unit.

What is the break-even point sales amount ([SBE]) and sales quantity ([QBE]) required for a profit ([PRF]) of \$400,000?

Before performing the calculation, change the "Profit Amount/Ratio" setting to "Amount (PRF)" and the "Break-Even Value" to "Quantity".

1. Tap [Calc(2)] - [Break-Even Point].
2. Input the values below into the applicable fields.
PRC = 100, VCU = 50, FC = 100000, PRF = 400000
3. Tap [QBE] to obtain the sales quantity.
4. Tap [SBE] to obtain the break-even point sales amount.

The screenshot shows the 'Break-Even Point' calculator interface. It has a title bar 'Edit Calc(1) Calc(2)' and a toolbar with navigation and editing icons. The main area is titled 'Break-Even Point' and contains several input fields: PRC (100), VCU (50), FC (100000), PRF (400000), QBE (10000), SBE (1000000), and r% (empty). At the bottom, there are buttons for 'Help' and 'Format', and a status bar showing 'Solve PRF Qty'.

1110 Margin of Safety

What is the margin of safety ([MOS]) when the sales amount ([SAL]) is \$1,200,000 and the break-even sales amount ([SBE]) is \$1,000,000?

1. Tap [Calc(2)] - [Margin of Safety].
2. Input 1200000 into the [SAL] field and 1000000 into the [SBE] field, and then tap [MOS].

The screenshot shows the 'Margin of Safety' calculator interface. It has a title bar 'Edit Calc(1) Calc(2)' and a toolbar. The main area is titled 'Margin of Safety' and contains input fields for SAL (1200000), SBE (1000000), and MOS (0.1666666667). At the bottom, there are buttons for 'Help' and 'Format', and a status bar showing 'Solve PRF Qty'.

1111 Operating Leverage

What is the degree of operating leverage for a company with sales ([SAL]) of \$1,200,000, variable costs ([VC]) of \$600,000, and fixed costs ([FC]) of \$200,000?

1. Tap [Calc(2)] - [Operating Leverage].
2. Input 1200000 into the [SAL] field, 600000 into the [VC] field, and 200000 into the [FC] field, and then tap [DOL].

The screenshot shows the 'Operating Leverage' calculator interface. It has a title bar 'Edit Calc(1) Calc(2)' and a toolbar. The main area is titled 'Operating Leverage' and contains input fields for SAL (1200000), VC (600000), FC (200000), and DOL (1.5). At the bottom, there are buttons for 'Help' and 'Format', and a status bar showing 'Solve PRF Qty'.

1112 Financial Leverage

Calculate the financial leverage ([DFL]) for a company that earns \$400,000 before interest and taxes ([EBIT]), \$80,000 of which is paid to bondholders ([INT]).

1. Tap [Calc(2)] - [Financial Leverage].
2. Input 400000 into the [EBIT] field and 80000 into the [INT] field, and then tap [DFL].

The screenshot shows the 'Financial Leverage' calculator interface. It has a title bar 'Edit Calc(1) Calc(2)' and a toolbar. The main area is titled 'Financial Leverage' and contains input fields for EBIT (400000), INT (80000), and DFL (1.25). At the bottom, there are buttons for 'Help' and 'Format', and a status bar showing 'Solve PRF Qty'.

1113 Combined Leverage

Calculate the Combined Leverage ([DCL]) for a company with variable costs ([VC]) of \$6,000, fixed costs ([FC]) of \$2,000, and sales ([SAL]) of \$12,000, of which \$1,000 is paid to bondholders ([INT]).

1. Tap [Calc(2)] - [Combined Leverage].
2. Input 12000 into the [SAL] field, 6000 into the [VC] field, 2000 into the [FC] field, and 1000 into the [INT] field, and then tap [DCL].

The screenshot shows the 'Combined Leverage' calculator interface. It has a title bar 'Edit Calc(1) Calc(2)' and a toolbar. The main area is titled 'Combined Leverage' and contains input fields for SAL (12000), VC (6000), FC (2000), INT (1000), and DCL (2). At the bottom, there are buttons for 'Help' and 'Format', and a status bar showing 'Solve PRF Qty'.

1114 Quantity Conversion

Calculate the sales quantity (Sales: [QTY]) when the sales amount ([SAL]) is \$100,000 and the sales price ([PRC]) is \$200 per unit. Next, calculate the total variable costs of production (Manufacturing: [VC]) when the variable cost per unit ([VCU]) is \$30 and the number of units manufactured ([QTY]) is 500.

1. Tap [Calc(2)] - [Quantity Conversion].
2. Input 100000 into the [SAL] field and 200 into the [PRC] field, and then tap [QTY].
3. Input 30 into the [VCU] field and 500 into the [QTY] field, and then tap [VC].

Quantity Conversion	
Sales	
SAL	100000
PRC	200
QTY	500
Manufacturing	
VC	15000
VCU	30
QTY	500

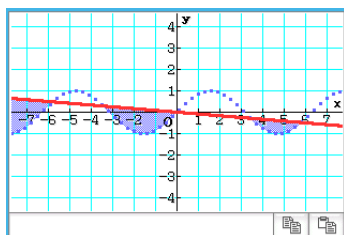
Chapter 12: Program Application

Note: The notation in the "Program" uses \square to represent a space and \leftarrow for a carriage return.

1201

Program:
 DefaultSetup \leftarrow
 ClrGraph \leftarrow
 ViewWindow \leftarrow
 SetInequalityPlot \square
 Intersection \leftarrow
 GraphType \square "y>" \leftarrow
 Define \square y1(x)=sin(x) \leftarrow
 GTSelOn \square 1 \leftarrow
 PTDot \square 1 \leftarrow
 SheetActive \square 1 \leftarrow
 DrawGraph \leftarrow
 GraphType \square "y<" \leftarrow
 Define \square y2(x)=-x/12 \leftarrow
 GTSelOn \square 2 \leftarrow
 PTNormal \square 2 \leftarrow
 SheetActive \square 1 \leftarrow
 DrawGraph

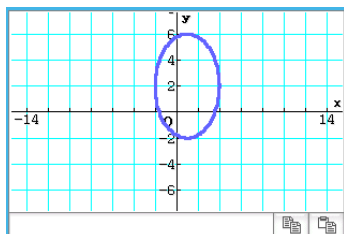
Result screen:



1202

Program:
 ClrGraph \leftarrow
 ViewWindow \square -15.4,15.4,2,-7.6,7.6,2 \leftarrow
 "(x-1)^2/3^2+(y-2)^2/4^2= 1"
 \Rightarrow ConicsEq \leftarrow
 DrawConics

Result screen:

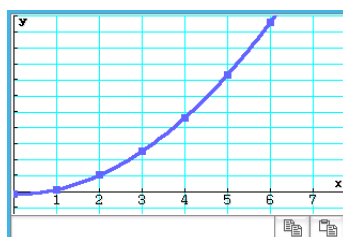


1203

Program:
 DefaultSetup \leftarrow
 ClrGraph \leftarrow
 ViewWindow \square 0,7.7,1,-14,110,10 \leftarrow
 GraphType \square "y=" \leftarrow
 Define \square y1(x)=3xx^2-2 \leftarrow
 GTSelOn \square 1 \leftarrow
 0 \Rightarrow FStart \leftarrow
 6 \Rightarrow FEnd \leftarrow
 1 \Rightarrow FStep \leftarrow
 SheetActive \square 1 \leftarrow
 DispFTable \leftarrow
 Pause \leftarrow
 DrawFTGCon

Result screen:

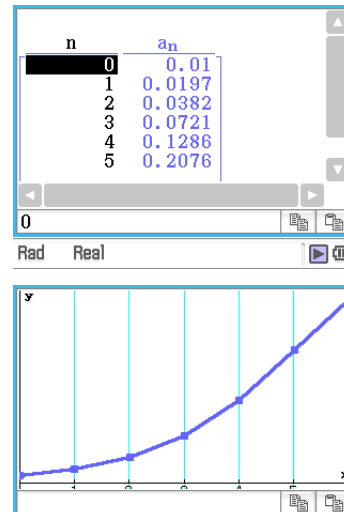
x	y1
0	-2
1	1
2	10
3	25
4	46
5	73



1204

Program:
 DefaultSetup \leftarrow
 ViewWindow \square 0,6,1,-0.01,0.3,1 \leftarrow
 SeqType "a_{n+1}a₀" \leftarrow
 "-3a_n²+2a_n" \Rightarrow a_{n+1} \leftarrow
 0 \Rightarrow SqStart \leftarrow
 6 \Rightarrow SqEnd \leftarrow
 0.01 \Rightarrow a₀ \leftarrow
 DispSeqTbl \leftarrow
 Pause \leftarrow
 DrawSeqCon

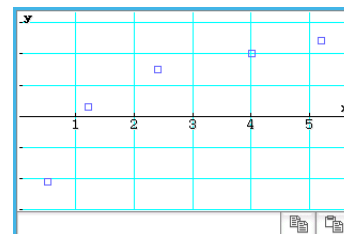
Result screen:



1205

Program:
 {0.5,1.2,2.4,4,5.2} \Rightarrow list1 \leftarrow
 {-2.1,0.3,1.5,2,2.4} \Rightarrow list2 \leftarrow
 StatGraph \square 1, On, Scatter, list1, list2, 1, Square \leftarrow
 DrawStat

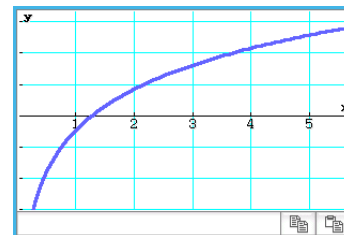
Result screen:



1206

Program:
 {0.5,1.2,2.4,4,5.2} \Rightarrow list1 \leftarrow
 {-2.1,0.3,1.5,2,2.4} \Rightarrow list2 \leftarrow
 StatGraph \square 1, On, LogR, list1, list2, 1 \leftarrow
 DrawStat

Result screen:



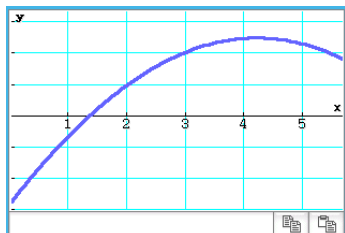
Note: MedMed, QuadR, CubicR, QuartR, LinearR, ExpR, abExpR, or PowerR can also be specified in instead of LogR for the graph type.

1207

Program:

```
{0.5,1.2,2.4,4,5.2}⇒list1 ↵
{-2.1,0.3,1.5,2,2.4}⇒list2 ↵
StatGraph□1, On, SinR, list1,
list2 ↵
DrawStat
```

Result screen:



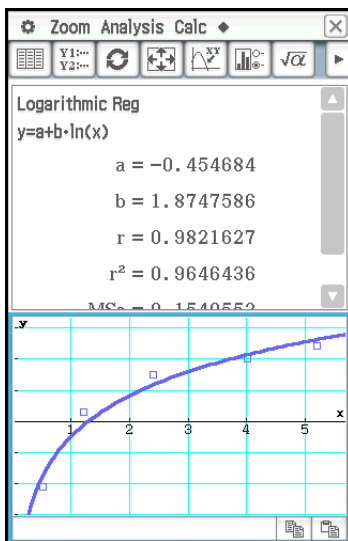
Note: LogisticR can also be specified in instead of SinR for the graph type.

1208

Program:

```
StatGraphSel□Off
{0.5,1.2,2.4,4,5.2}⇒list1 ↵
{-2.1,0.3,1.5,2,2.4}⇒list2 ↵
StatGraph□1, On, Scatter, list1,
list2, 1, Square ↵
DrawStat ↵
LogReg□list1, list2, 1 ↵
DispStat ↵
DrawStat
```

Result screen:

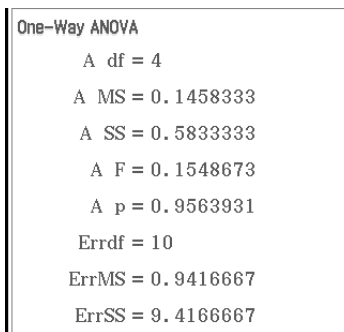


1209

Program:

```
{7,4,6,6,5,6,5,5,8,7,4,7,6,7,6}
⇒list1 ↵
{1,1,1,1,1,2,2,2,2,2,3,3,3,3,3}
⇒list2 ↵
OneWayANOVA□list1, list2 ↵
DispStat
```

Result screen:

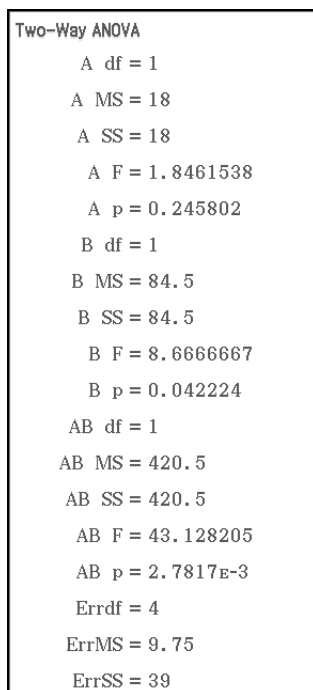


1210

Program:

```
{1,1,1,1,2,2,2,2}⇒list1 ↵
{1,1,2,2,1,1,2,2}⇒list2 ↵
{113,116,139,132,133,131,126,
122}⇒list3 ↵
TwoWayANOVA list1, list2, list3 ↵
DispStat
```

Result screen:

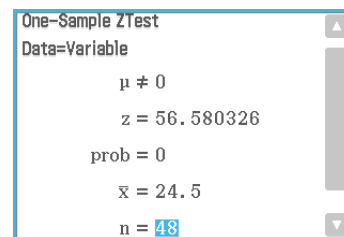


1211

Program:

```
OneSampleZTest□"≠",0,3,24.5,
48 ↵
DispStat
```

Result screen:



1212

Program:

```
Input Month ↵
Input Date ↵
Input Year ↵
DateMode365 ↵
dayCount(07,04,1976,Month,
Date,Year)⇒days ↵
Print "Days=" ↵
Print days
```

Result screen:

Shows the result for the following input: Month: 7, Date: 4, Year: 2013.

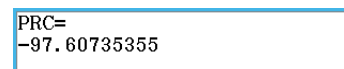


1213

Program:

```
DateMode360 ↵
PeriodsSemi ↵
bondPriceDate(6,1,2004,12,15,
2006,100,3,4)⇒list1 ↵
list1[1]⇒price ↵
Print "PRC=" ↵
Print approx(price)
```

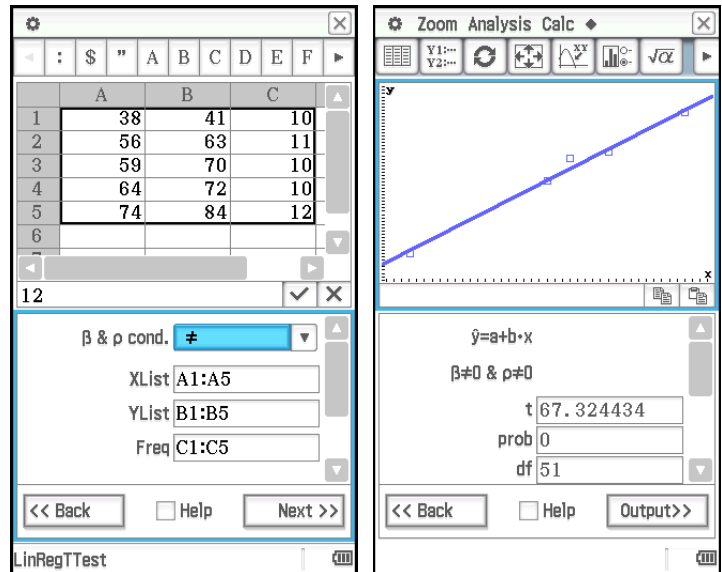
Result screen:



Chapter 13: Spreadsheet Application

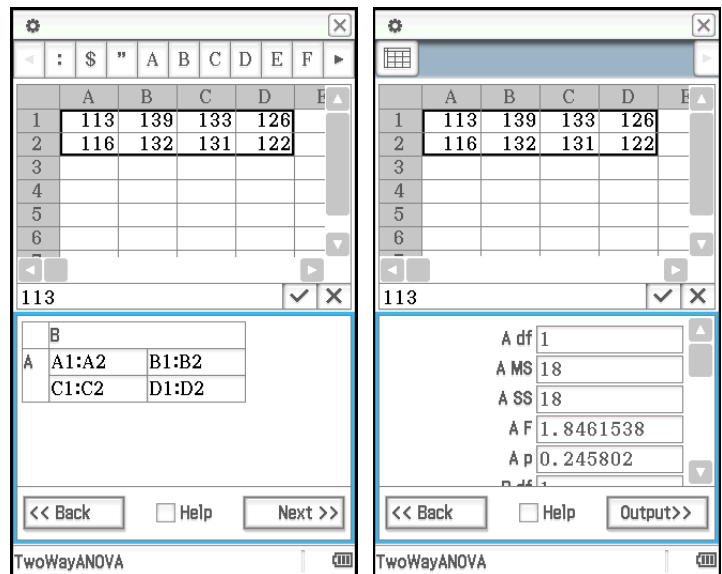
1301

1. On the Spreadsheet window, input the data and then select input range cells A1:C5.
2. Tap [Calc] - [Test] - [Linear Reg t -Test], and then tap [Next>>].
 - This will automatically insert the cell references into the fields as shown in the nearby screen shot.
3. Tap [Next>>].
4. Tap Ψ to draw the linear regression graph.



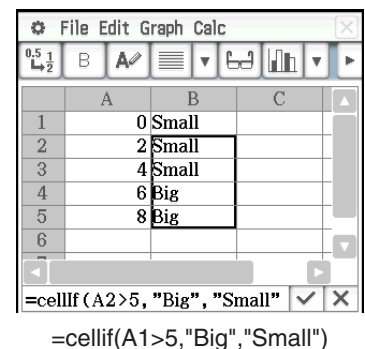
1302

1. On the Spreadsheet window, input the data and then select input range cells A1:D2.
2. Tap [Calc] - [Test] - [Two-Way ANOVA], and then tap [Next>>].
3. Select "2 x 2" as the dimensions of the ANOVA data table, and then tap [Next>>].
4. After confirming that cell references have been automatically inserted into the fields as shown in the nearby screen shot, tap [Next>>].



1303

1. Input values into cells A1 through A5.
2. Tap cell B1. Next, on the [Calc] menu, tap [Cell-Calculation] and then [cellIf].
 - This will input "=cellif(" into the cell.
3. Tap A1 to input the cell reference "A1".
4. Tap the edit box and then use the soft keyboard to input the rest of the expression.
5. Tap the button next to the edit box or press the [EXE] key.
6. Copy the contents of cell B1 to cells B2 through B5.



1304

1. Input values into cells A1 through C3.
2. Tap cell C5. Next, on the [Calc] menu, tap [List-Statistics] and then [mean].
 - This will input “=mean(” into the cell.
3. Drag from cell A1 to cell C3 to input the cell reference “A1:C3”.
4. Tap the button next to the edit box or press the **EXE** key.

	A	B	C
1	11	14	17
2	12	15	18
3	13	16	19
4			
5			15
6			

=mean(A1:C3) ✓ X

1305

1. Input values into cells A1 through B3.
2. Tap cell B5. Next, on the [Calc] menu, tap [List-Calculation] and then [sum].
3. Drag from cell A1 to cell A3 to input the cell reference “A1:A3”.
4. Press **'** and then drag from B1 to B3 to input the cell reference “B1:B3”.
5. Tap the button next to the edit box or press the **EXE** key.

	A	B	C
1	1	5	
2	2	4	
3	3	6	
4			
5		31	
6			

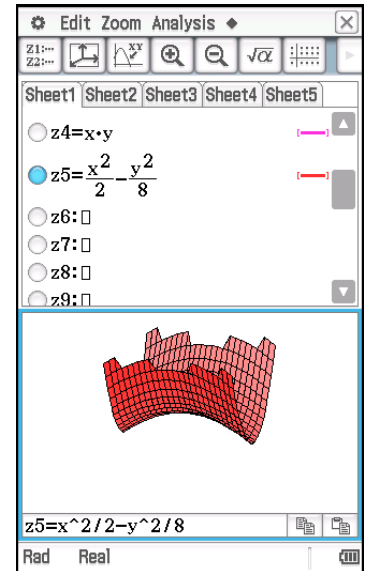
=sum(A1:A3, B1:B3) ✓ X

Chapter 14: 3D Graph Application

Note: The example below uses initial default View Window settings.

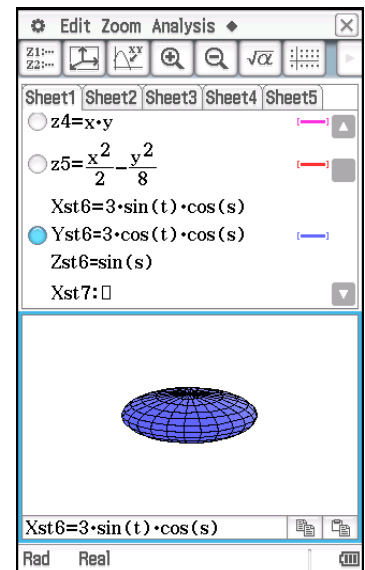
1401

1. In the 3D Graph application, make the 3D Graph Editor window active.
2. If $\boxed{\text{Xst}}$ is displayed on the toolbar, tap to toggle it to $\boxed{\text{Z=}}$.
3. In a blank line (z5 in this example), input $\frac{x^2}{2} - \frac{y^2}{8}$.
4. Press $\boxed{\text{EXE}}$.
 - This stores the expression you input and selects it, which is indicated by the button changing to “●”.
5. Tap $\boxed{\text{Graph}}$ to graph the expression.



1402

1. In the 3D Graph application, make the 3D Graph Editor window active.
2. If $\boxed{\text{Z=}}$ is displayed on the toolbar, tap to toggle it to $\boxed{\text{Xst}}$.
3. In a blank Xst line (Xst6 in this example), input $3\sin(t) \times \cos(s)$.
4. In the Yst line immediately under the Xst line, input $3\cos(t) \times \cos(s)$.
5. In the Zst line immediately under the Yst line, input $\sin(s)$.
6. Press $\boxed{\text{EXE}}$.
7. Tap $\boxed{\text{Graph}}$ to graph the expression.



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