ClassPad II
Examples

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Contents

About this booklet...

This booklet contains a collection of examples of operations explained in the ClassPad II User's Guide.

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

Chapter 2: Main Application

0201

Calculation	Key Operation
56 × (−12) ÷ (−2.5) = 268.8	5 6 × ((−) 1 2) ÷ ((−) 2 . 5) EXE
2 + 3 × (4 + 5) = 29	2 + 3 × (4 + 5) EXE
$\dfrac{6}{4 \times 5} = 0.3$	6 ÷ (4 × 5) EXE or ▦* 6 ▼ 4 × 5 EXE * The soft keyboard [Math1] key set

0202 2.54 × 10³ = 2540   2 . 5 4 EXP 3 EXE

1600 × 10⁻⁴ = 0.16   1 6 0 0 E − 4 EXE

```
2.54E3
                    2540
1600E-4
                    0.16
```

0203 123 + 456 = <u>579</u>   1 2 3 + 4 5 6 EXE

789 − <u>579</u> = 210   7 8 9 − ans EXE

210 ÷ 7 = 30   ÷ 7 EXE

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

0204 x : = 1 2 3 EXE

```
x:=123
                    123
```

0205 Tapping ⬚ while the ClassPad is configured for Standard mode (Normal 1) display

Expression	ClassPad Operation	Displayed Result
100 ÷ 6 = 16.6666666...	1 0 0 ÷ 6 ⬚ (Switches to Decimal mode format.)	16.66666667
	⬚ (Switches back to Standard mode format.)	$\dfrac{50}{3}$

0206 Tapping ⬚ while the ClassPad is configured for Decimal mode (Normal 1) display

Expression	ClassPad Operation	Displayed Result
$\sqrt{2}$ + 2 = 3.414213562...	√▪ 2 ▶ + 2 ⬚ (Switches to Standard mode format.)	$\sqrt{2}$ + 2
	⬚ (Switches back to Decimal mode format.)	3.414213562

0207 (Complex mode and Real mode calculation results)

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

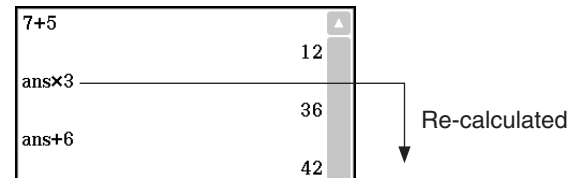**0208** (Assistant mode and Algebra mode calculation results)

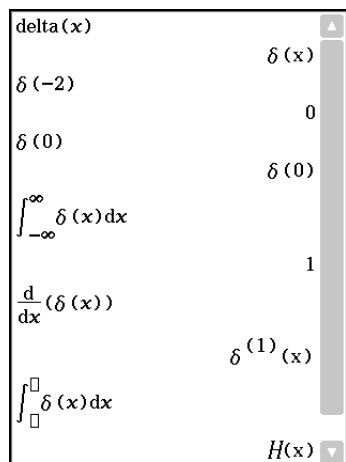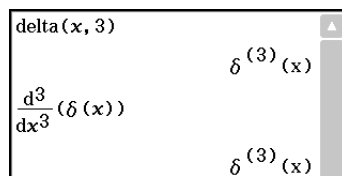| Expression	Assistant Mode	Algebra Mode
$x^2 + 2x + 3x + 6$	$x^2 + 2\cdot x + 3\cdot x + 6$	$x^2 + 5\cdot x + 6$
expand $((x+1)^2)$	$x^2 + 2\cdot x\cdot 1 + 1^2$	$x^2 + 2\cdot x + 1$
$x + 1$ (When 1 is assigned to x)	$x + 1$	2

0209   1. Tap location ①.   2. [←] [3] [EXE]

Re-calculated
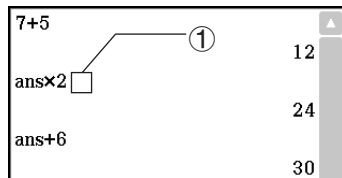
0210

0211

0212
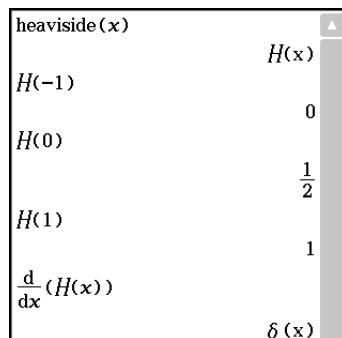
0213
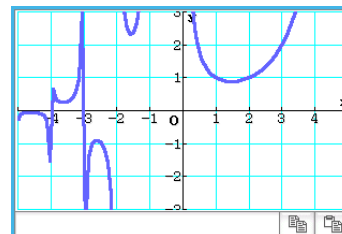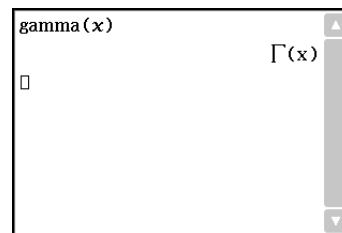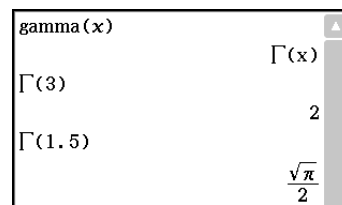
0214   [{] [1] [,] [2] [,] [3] [}] [⇒] [l] [i] [s] [t] [a] [EXE]
or
[{}] [1] [,] [2] [,] [3] [▶] [⇒] [l] [i] [s] [t] [a] [EXE]
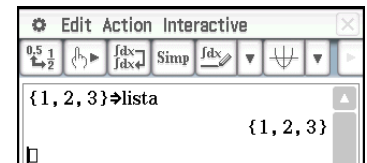
0215   [l] [i] [s] [t] [a] [[] [2] []] [EXE]
or
[l] [i] [s] [t] [a] [[]] [◀] [2] [EXE]
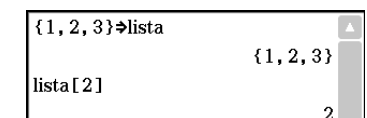
0216 [5] [→] [l] [i] [s] [t] [a] [[ ] [2] [ ]] [EXE]

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

[ans] [[ ] [2] [ ]] [EXE] 2

0217 [l] [i] [s] [t] [3] [×] [{] [6] [,] [0] [,] [4] [}] [EXE]

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

0218 [{] [1] [0] [,] [2] [0] [,] [3] [0] [}] [→] [{] [x] [,] [y] [,] [z] [}] [EXE]

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

0219 [[ ] [[ ] [1] [,] [2] [ ]] [[ ] [3] [,] [4] [ ]] [ ]] [→] [m] [a] [t] [1] [EXE]
or
[ ] [◄] [ ] [◄] [1] [,] [2] [►] [ ] [◄] [3] [,] [4] [►] [►] [→] [m] [a] [t] [1] [EXE]

```
⚙ Edit Action Interactive  ✕
[toolbar icons]
[[1,2][3,4]]→mat1
                [1 2]
                [3 4]
▯
```

0220 [m] [a] [t] [1] [[ ] [2] [,] [1] [ ]] [EXE]

     ↑   ↑
   Row   Column

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

0221 [5] [→] [m] [a] [t] [1] [[ ] [1] [,] [2] [ ]] [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. [▣] (Creates a 1-row × 2-column matrix.)

   [1] [►] [2]

```
[1 2▯]
```

2. [▣] (Adds one column to the matrix.)

   [3]

```
[1 2 3▯]
```

3. [▤] (Adds one row to the matrix.)

   [4] [►] [5] [►] [6]

```
[1 2 3]
[4 5 6▯]
```

4. Assign the matrix to the variable named "mat2".

   [►] [→] [m] [a] [t] [2] [EXE]

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

0223 ⬚ ⬚ ①, ① ⬚ ② , ① ⬚ ⬚ +
⬚ ⬚ ② , ③ ⬚ ⬚ ② , ① ⬚ ⬚ EXE

$$[[1,1][2,1]]+[[2,3][2,1]]$$
$$\begin{bmatrix} 3 & 4 \\ 4 & 2 \end{bmatrix}$$

0224 ▦ ① ▶ ① ▼ ◀ ② ▶ ①

$$\begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix}$$

▶ ✕

$$\begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix}\!\times$$

▦ ② ▶ ③ ▼ ◀ ② ▶ ① EXE

$$\begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix}\times\begin{bmatrix} 2 & 3 \\ 2 & 1 \end{bmatrix}$$
$$\begin{bmatrix} 4 & 4 \\ 6 & 7 \end{bmatrix}$$

0225 ⬚ ⬚ ① , ② ⬚ ③ , ④ ⬚ ⬚ ✕ ⑤ EXE

$$[[1,2][3,4]]\times5$$
$$\begin{bmatrix} 5 & 10 \\ 15 & 20 \end{bmatrix}$$

0226 ⬚ ⬚ ① , ② ⬚ ③ , ④ ⬚ ⬚ ∧ ③ EXE

$$[[1,2][3,4]]^3$$
$$\begin{bmatrix} 37 & 54 \\ 81 & 118 \end{bmatrix}$$

0227 ▦ ① ▶ ② ▼ ◀ ③ ▶ ④ ▶ ▫ ③ EXE

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}^3$$
$$\begin{bmatrix} 37 & 54 \\ 81 & 118 \end{bmatrix}$$

0228 ▤ ① ⓪ ▼ ② ⓪ ▤ ③ ⓪ ▶ ⇒ ▤ x ▼ y ▤ z EXE

$$\begin{bmatrix} 10 \\ 20 \\ 30 \end{bmatrix}\Rightarrow\begin{bmatrix} x \\ y \\ z \end{bmatrix}$$
$$\begin{bmatrix} 10 \\ 20 \\ 30 \end{bmatrix}$$

0229

1. Tap the down arrow button next to the 🔽 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 🔽 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 🔽 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]

```
1010 and 1100
                    1000b
```

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

⬚1⬚ ⬚0⬚ ⬚1⬚ ⬚1⬚ [Space] [o] [r] [Space] ⬚1⬚ ⬚1⬚ ⬚0⬚ ⬚1⬚ ⬚0⬚ [EXE]

```
1011 or 11010
                   11011b
```

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

⬚1⬚ ⬚0⬚ ⬚1⬚ ⬚0⬚ [Space] [x] [o] [r] [Space] ⬚1⬚ ⬚1⬚ ⬚0⬚ ⬚0⬚ [EXE]

```
1010 xor 1100
                     110b
```

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

[n] [o] [t] ⬚(⬚ [f] [f] [f] [f] ⬚)⬚ [EXE]

```
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.

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

0235

1. ⬚x⬚ ⬚^⬚ ⬚3⬚ ⬚−⬚ ⬚3⬚ ⬚x⬚ ⬚^⬚ ⬚2⬚ ⬚+⬚ ⬚3⬚ ⬚x⬚ ⬚−⬚ ⬚1⬚

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

```
⚙ Edit Action Interactive          ☒
 0.5 1  ✋▶  ∫dx↵ Simp ∫dx↗ ▼ ⎷ ▼  ▶
 2
 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. $\boxed{x}$ $\boxed{\wedge}$ $\boxed{2}$ $\boxed{+}$ $\boxed{2}$ $\boxed{x}$

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.
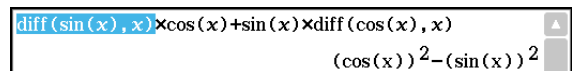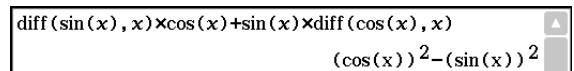   Variable: x, Lower: 1, Upper: 2

6. Tap [OK].

$$\int_{1}^{2} x^2 + 2 \cdot x \, dx$$

$$\frac{16}{3}$$
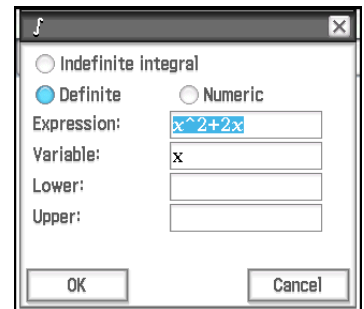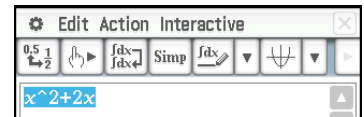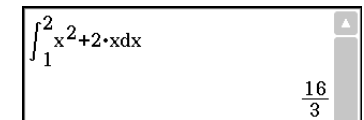
0237

1. Input the calculation below and execute it.
   diff(sin(x),x) × cos(x) + sin(x) × diff(cos(x),x)

   $$\text{diff}(\sin(x),x) \times \cos(x) + \sin(x) \times \text{diff}(\cos(x),x)$$
   $$(\cos(x))^2 - (\sin(x))^2$$

2. Drag the stylus across "diff(sin(x),x)" to select it.

   $$\text{diff}(\sin(x),x) \times \cos(x) + \sin(x) \times \text{diff}(\cos(x),x)$$
 $$(\cos(x))^2 - (\sin(x))^2$$

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 (× cos(x) + sin(x) × diff(cos(x),x)) is output to the display as-is.

   $$\text{apply}(\text{diff}(\sin(x),x)) \times \cos(x) + \sin(x) \times \text{diff}(\cos(x),x)$$
   $$\cos(x) \cdot \cos(x) + \sin(x) \cdot \frac{d}{dx}(\cos(x))$$
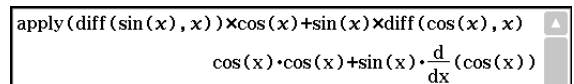
0238

1. Tap $\boxed{\substack{Y1:- \\ Y2:-}}$ 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.
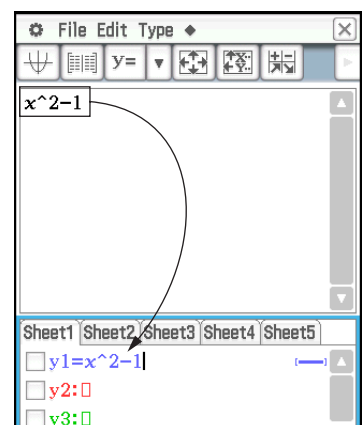
0239

1. Tap ⊞ to display the Graph window in the lower window.

2. Drag the stylus across "$x\text{^}2 - 1$" in the work area to select it.

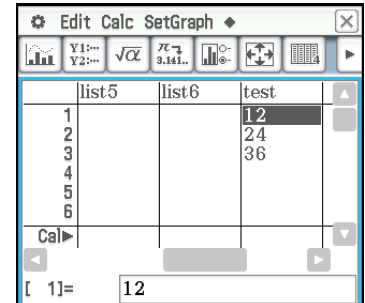3. Drag the selected expression to the Graph window.
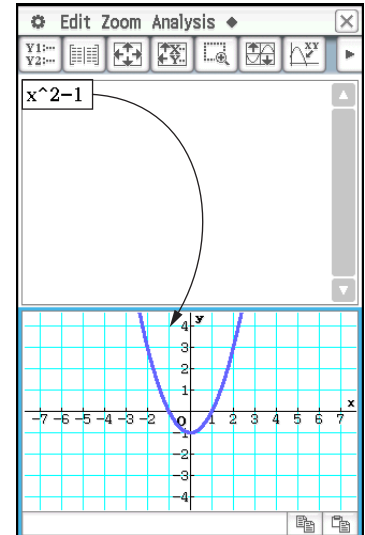
0240

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.
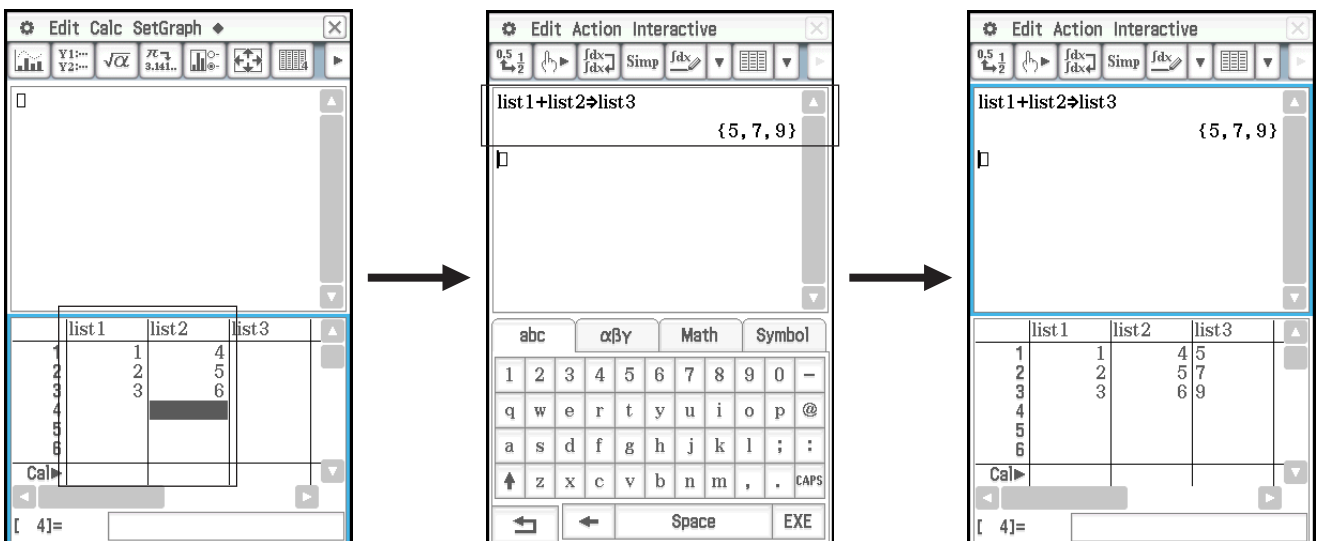
0241

1. Tap the Main application work area window to make it active.

2. Perform the operation {12, 24, 36} ⇒ 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 ▶ 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 [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 [⊙△] 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.
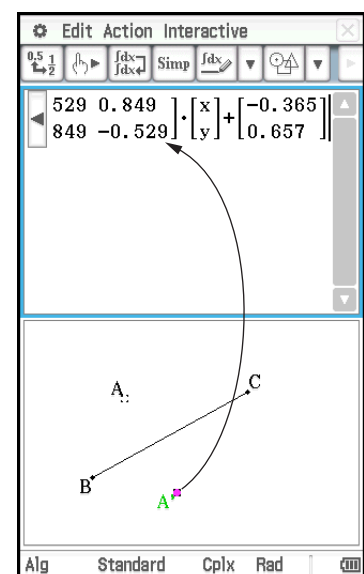   • An ellipse appears in the Geometry window.
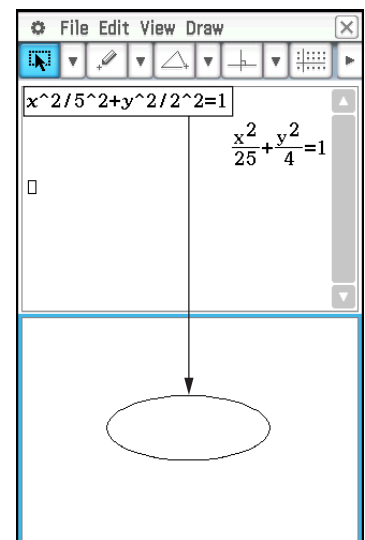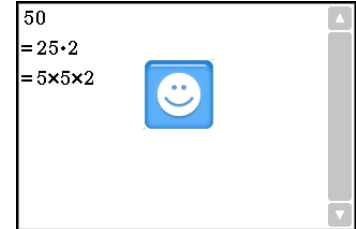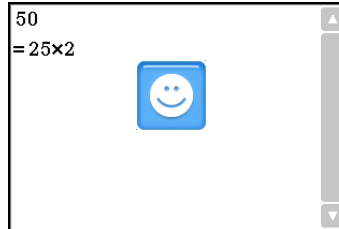
0243
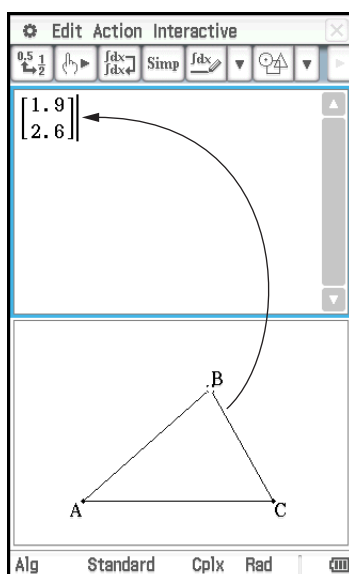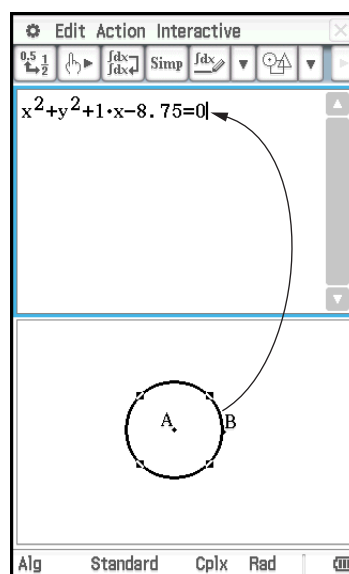
Point	Circle	A point and its image

0244

1. Start up Verify.

2. Input 50 and press ⌊EXE⌋.

3. Following the equal sign (=), input 25 × 3 and press ⌊EXE⌋.
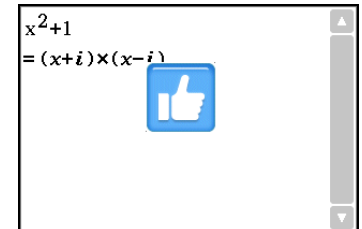
4. Tap [OK] to close the error dialog that appears.

```
50
= 25×3
ERROR!                    ×
☹  Sorry, not equivalent
        OK
```

5. Change 25 × 3 to 25 × 2 and press ⌊EXE⌋.

6. Following the next equal sign (=), input 5 × 5 × 2 and press ⌊EXE⌋.

```
50
= 25×2
        ☺
```
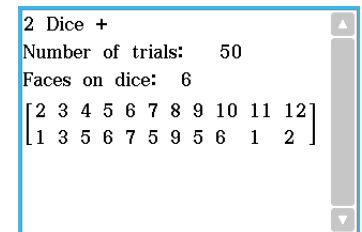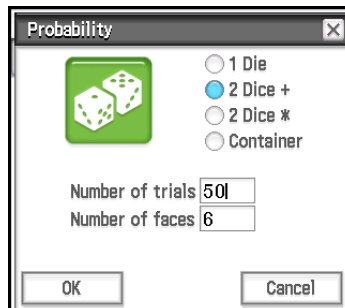
```
50
= 25·2
= 5×5×2
        ☺
```

0245

1. Tap ⌊▯⌋ 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⌋.
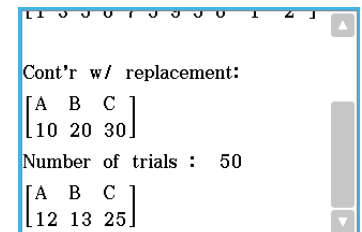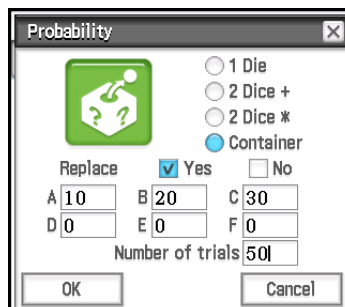
```
x² + 1
= (x+i)×(x-i)
        👍
```

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.

```
Probability               ×
        ○ 1 Die
        ● 2 Dice +
        ○ 2 Dice *
        ○ Container
Number of trials 50
Number of faces  6
  OK            Cancel
```

```
2  Dice  +
Number  of  trials:    50
Faces  on  dice:    6
⎡2  3  4  5  6  7  8  9  10  11  12⎤
⎣1  3  5  6  7  5  9  5  6   1   2 ⎦
```

0247

1. Tap ⌊▤⌋ 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].

```
Probability               ×
        ○ 1 Die
        ○ 2 Dice +
        ○ 2 Dice *
        ● Container
Replace   ☑ Yes   ☐ No
A 10    B 20    C 30
D 0     E 0     F 0
  Number of trials 50
  OK            Cancel
```

```
[1  3  5  6  7  5  9  5  6   1   2 ]
Cont'r  w/  replacement:
⎡A   B   C ⎤
⎣10  20  30⎦
Number  of  trials :    50
⎡A   B   C ⎤
⎣12  13  25⎦
```

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

0248

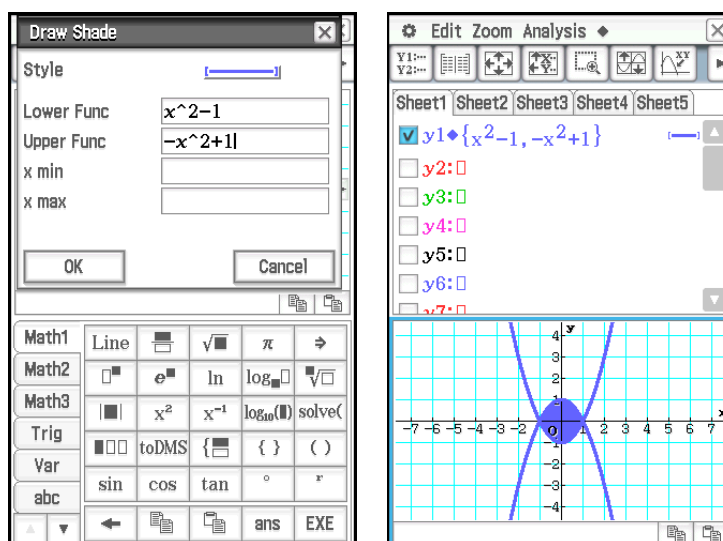1. ⟨O⟩ ⟨C⟩ ⟨T⟩ ⟨A⟩ ⟨(⟩ ⟨)⟩ ⟨EXE⟩
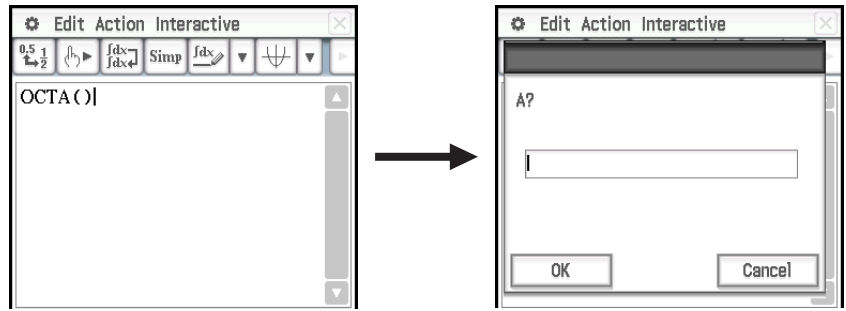
2. Enter 20 and then tap [OK].
   - This will run OCTA and display the results in the program output window.

Program output window

```
1385.640646
3771.236166
```
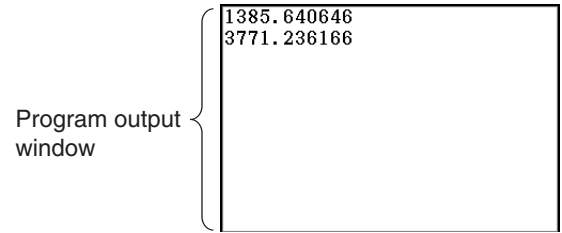
Chapter 3:
Graph & Table Application

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 $y1$, 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 $y1$ 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 ↰ Esc on the icon panel.
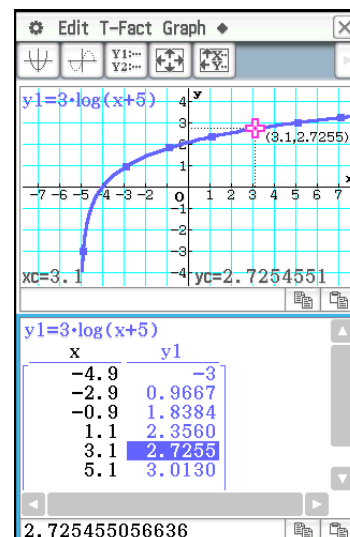
0303

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.

4. Tap the Graph window to make it active. Next, tap [Analysis] and then [Trace].
   - This causes a pointer to appear on the graph.

5. 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.

6. Press $\boxed{\text{EXE}}$ to input the coordinates at the current cursor position at the end of the table.

7. Repeat steps 5 and 6 to input the rest of the coordinates you want.
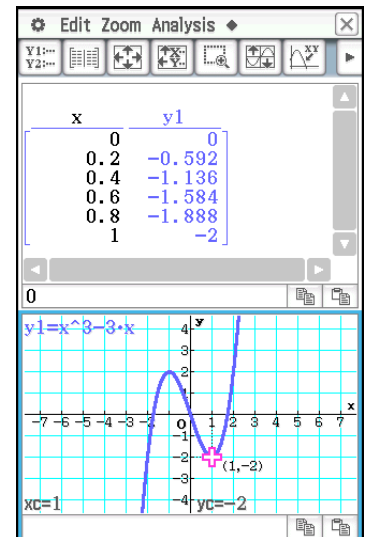
0304

1. In line $y1$ of the Graph Editor window, input and save $x^2 - x - 2$, and then tap $\boxed{\text{⊞}}$.

2. 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

1. While the Graph window is active, tap [Analysis], [Sketch], and then [Circle].
   - This display "Circle" on the Graph window.

2. 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

1. While the Graph window is active, tap [Analysis], [Sketch], and then [Vertical].
   - This display "Vertical" on the Graph window.

2. Press $\boxed{2}$.
   - 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.

3. 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

1. On the Graph Editor window, input and store $y = x + 1$ into line $y1$ and $y = x^2$ into $y2$, and then tap ⊞ to graph them.

2. 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.
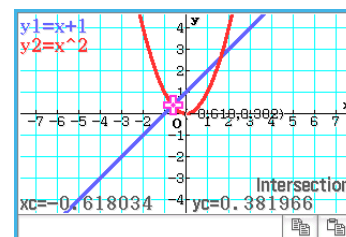
3. To obtain other points of intersection, press the left or right cursor key, or tap the left or right graph controller arrows.
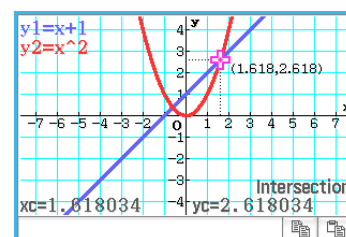
0308

1. On the Graph Editor window, input and store $y = x (x + 2)(x − 2)$ into line $y1$, and then tap ⊞ to graph it.

2. 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.

3. 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.
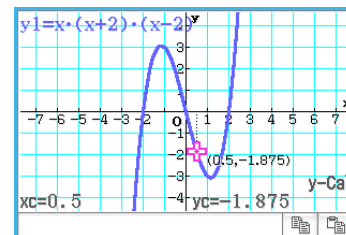
4. To obtain the value of x for a particular y-value, tap [Analysis], [G-Solve], [x-Cal/y-Cal], and then [x-Cal].
   - This displays a dialog box for specifying the y-value.

5. 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.
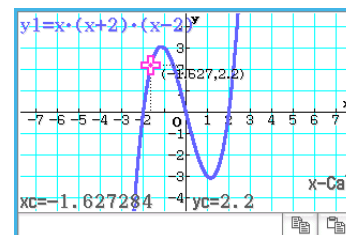
Tip: When there are multiple results for the above procedure, press ▶ to calculate the next value. Pressing ◀ returns to the previous value.

0309

1. On the Graph Editor window, input and store $y = x(x + 2)(x - 2)$ into line $y1$, and then tap ⊞ to graph it.

2. Tap [Analysis], [G-Solve], [Integral], and then [$\int dx$].
   - This displays "Lower" on the Graph window.

3. Press ⬚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].
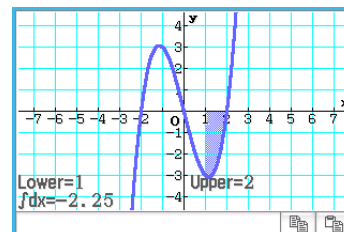
0310

1. On the Graph Editor window, input and store $y = x^3 - 1$ into line $y1$, and then tap ⊞ 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.
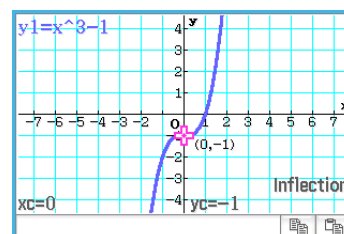
Tip: If your function has multiple inflection points, use the cursor keys or graph controller arrows to move the pointer between them and display their coordinates.

0311

1. On the Graph Editor window, input and store $y = x^2 - x - 2$ into line $y1$, and then tap ⊞ 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 ⬚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.
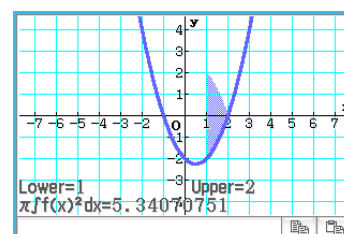
1. If the graph controller is not displayed on the Graph window, perform the operation below.
   (1) Tap ⚙ and then [Graph Format] to display the Graph Format dialog box.
   (2) Select the "G-Controller" check box.
   (3) Tap [Set].

2. On the Graph Editor window, input $2x^2 + 3x - 1$ in line $y1$, and $2x + 1$ in line $y2$.

3. Tap ⊎ to graph the function.

4. Tap [Analysis] and then [Modify].
   • This displays a dialog box for inputting the step.

5. 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.

6. In the function displayed in the message box, select the parameter you want to change.

7. 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.
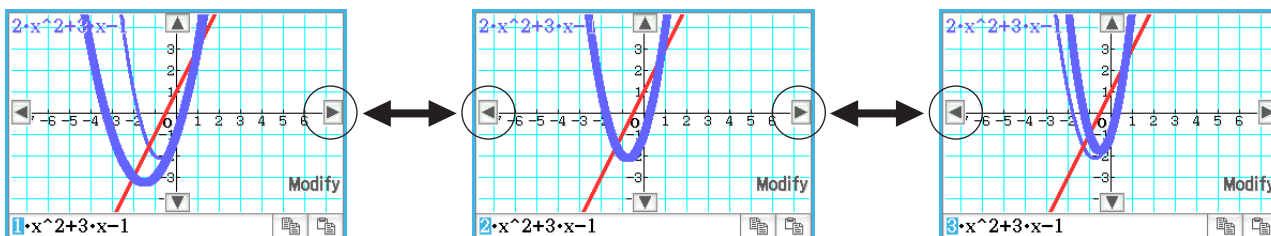
   • At this point, you could select other parameters and change their values as well, if you want.

8. 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.
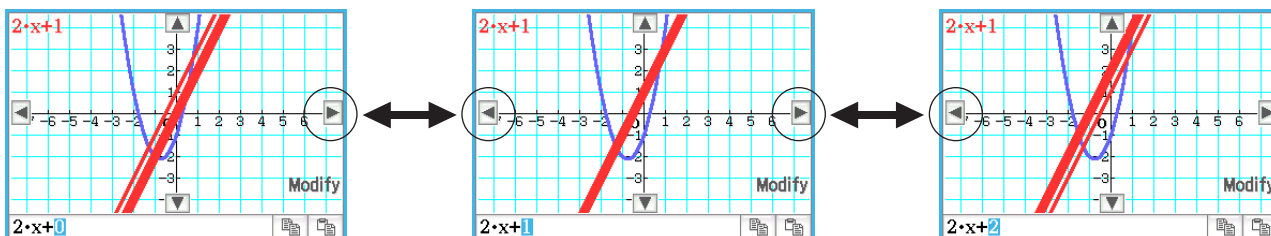
9. To quit graph modification, tap ⤺Esc on the icon panel.

1. On the Graph Editor window, input $ax^2 - bx$ in line $y1$, and $ax + b$ in line $y2$.

2. Tap ◆ and then [Dynamic Graph] or tap ⊎.

3. On the menu that appears when you tap the upper left corner of the slider display box, tap [Settings].

4. 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

5. 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.
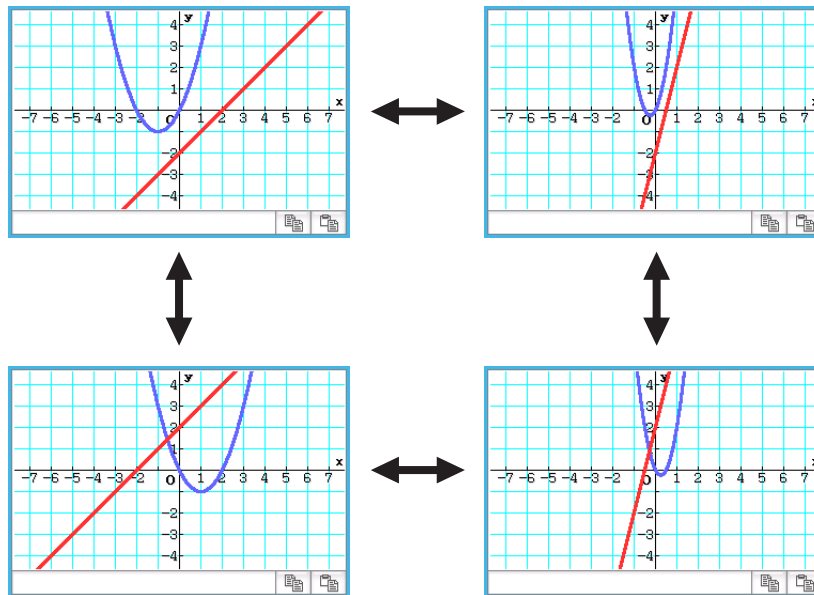
   - If you tapped [Auto Play], tap ↰ (Esc) or press ⏻ Clear to stop graph form modification.

Chapter 4:
Conics Application

0401

1. On the Conics Editor window, tap ▣ to display the Select Conics Form dialog box.

2. 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:

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

3. Change the parameters of the equation as follows:
   A = 2, K = 1, H = –2.

Conics Equation:

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

4. Tap ▨ to graph the equation.
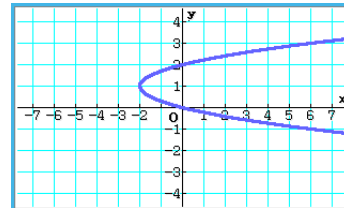
0402

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

Conics Equation:

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

2. 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:

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

0403 Symmetry

$y=1$

0404 Center

$xc=-2$ $yc=3$

0405 Radius

$r=2$

0406 Asymptotes

$y=-3 \cdot (x-1)/2+2, y=3 \cdot (x-1$
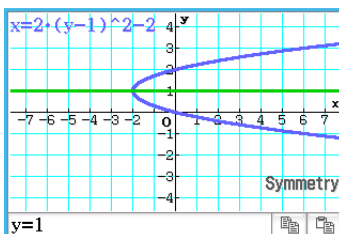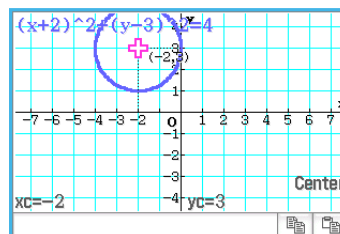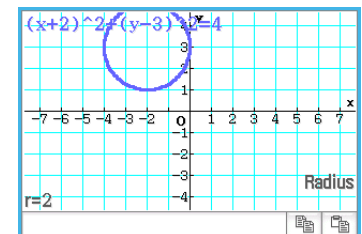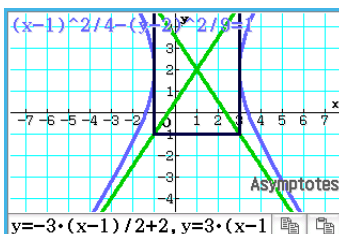
0407 Eccentricity
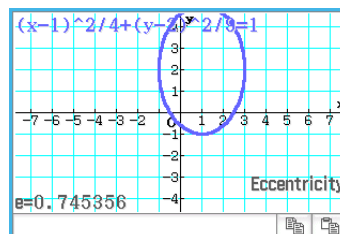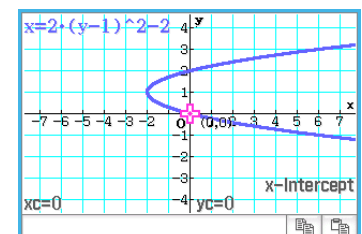
$e=0.745356$

0408 x-Intercept

$xc=0$ $yc=0$

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.
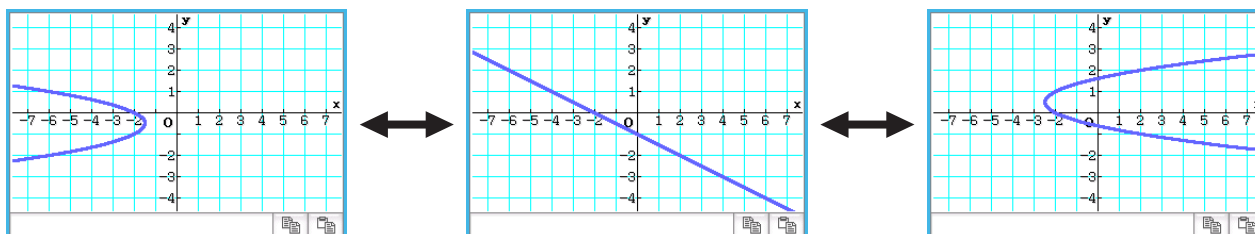
   • Tapping the upper left corner of the slider display box and then tapping [Auto Play] on the menu that appears will automatically cycle the value assigned to the applicable parameter between its minimum and maximum values.
   (Simultaneous execution of multiple parameters with Auto Play is not supported.)

8. To quit graph modification, tap the close button (✖) in the upper right corner of the slider display box.

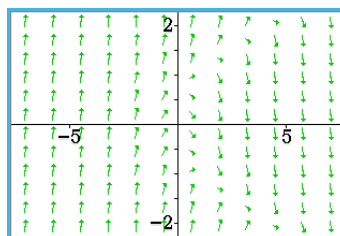# Chapter 5:
Differential Equation Graph Application

0501

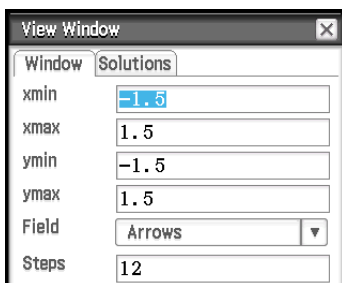1. On the Differential Equation Editor window, tap [Type] - [1st (Slope Field)] or [Y'~].

2. [y] [^] [2] [−] [x] [EXE]
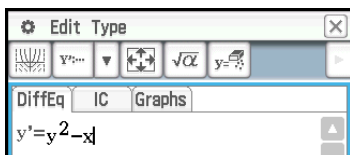
3. Tap [⊞] to draw the slope field.

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

5. Tap [OK].
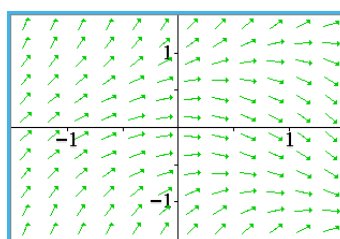
This updates the slope field in accordance with the new View Window settings.

0502

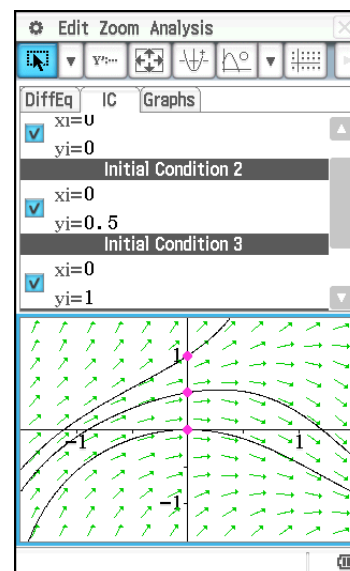1. Activate the Differential Equation Editor window and then tap the [IC] tab.
   • This displays the initial condition editor.

2. On the initial condition editor, input the following initial conditions:
   $(xi, yi) = (0, 0), (0, 0.5), (0, 1)$.

3. Tap [⊞].
   • 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 the icon.

2. $\boxed{x}$ $\boxed{\text{EXE}}$ $\boxed{-}$ $\boxed{y}$ $\boxed{\text{EXE}}$
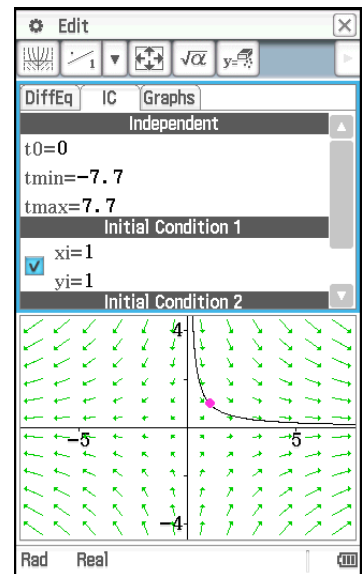

3. Tap the icon to draw the phase plane.
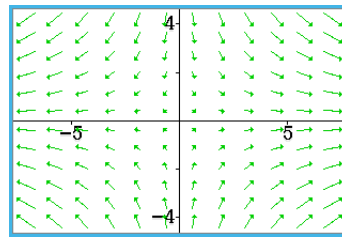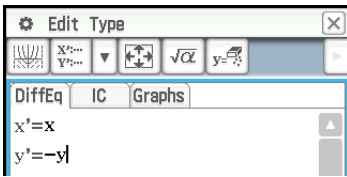
0504

1. Activate the Differential Equation Editor window and then tap the [IC] tab.
   • This displays the initial condition editor.

2. Input $(xi, yi) = (1, 1)$ on the initial condition editor.

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

0505

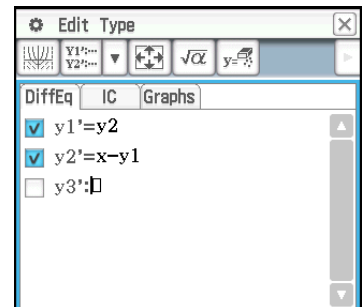1. On the Differential Equation Editor window, tap [Type] - [Nth (No Field)] or the icon.

2. Input $y'' = x - y$ by dividing it into two first order differential equations. If we let $y1 = y$ and $y2 = y'$, we see that $y1' = y' = y2$ and $y2' = y'' = x - y1$.

   $\boxed{y}$ $\boxed{2}$ $\boxed{\text{EXE}}$

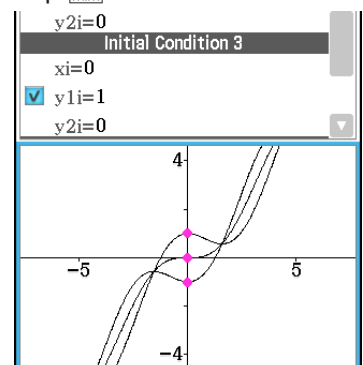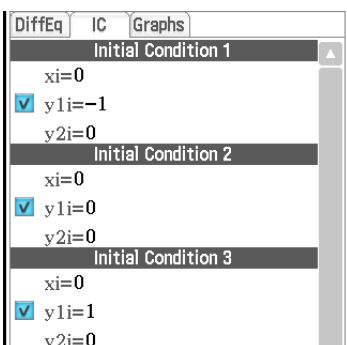 $\boxed{x}$ $\boxed{-}$ $\boxed{y}$ $\boxed{1}$ $\boxed{\text{EXE}}$
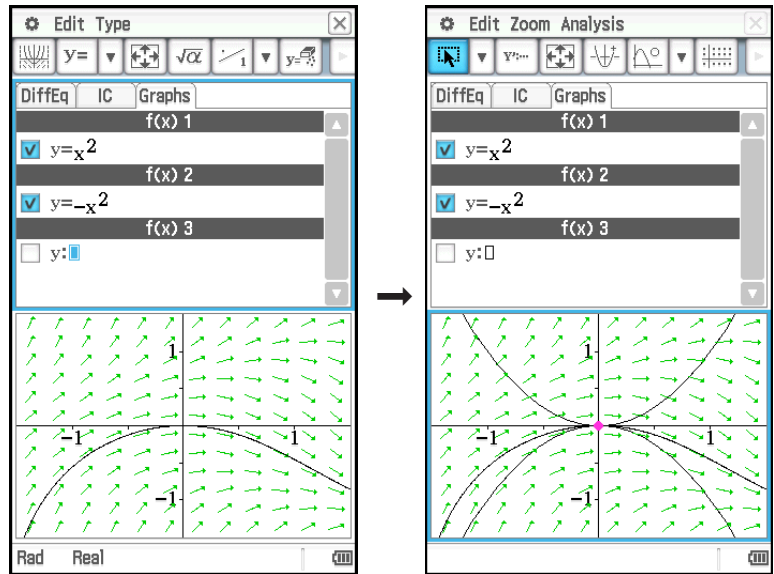
3. Tap the [IC] tab to display the initial condition editor.

4. Input $(xi, y1i, y2i) = (0, -1, 0), (0, 0, 0), (0, 1, 0)$.


5. Tap the icon.

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 xt=, 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.
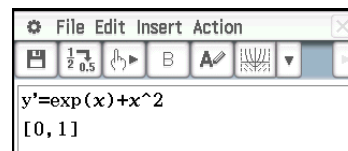   • To adjust the graph window, tap [Zoom] and then [Quick Initialize].
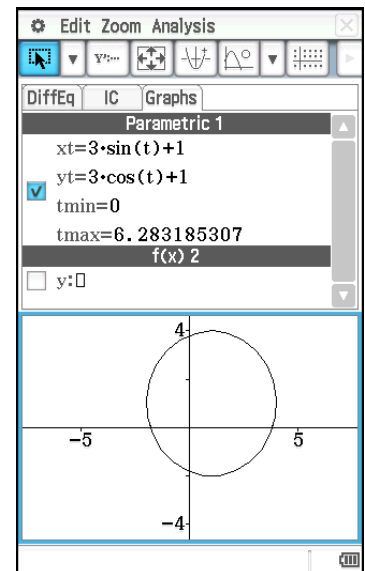
0508

1. Start up the eActivity application and input the following expression and matrix.
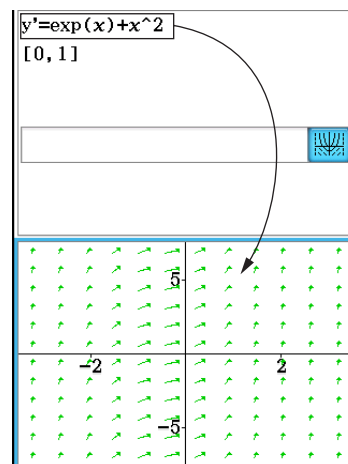
   $y' = \exp(x) + x^2$

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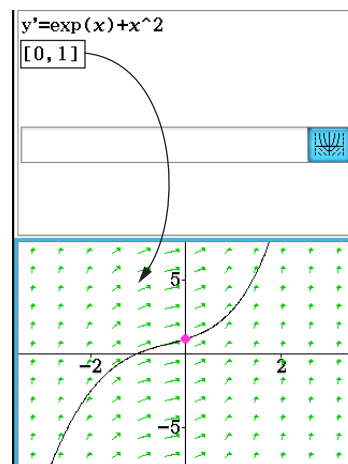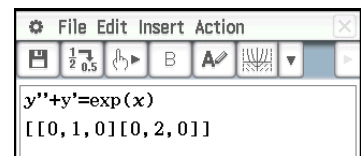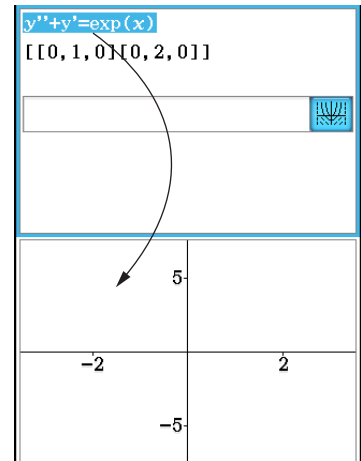
3. Drag the stylus across "$y'' + y' = \exp(x)$" on the eActivity application window to select it.

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.

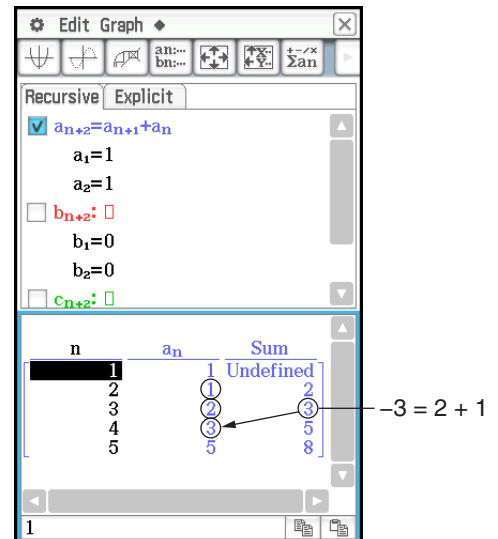6. Drag the selected matrix to the Differential Equation Graph window.
   - This graphs the solution curves of $y'' + y' = \exp(x)$ in accordance with the initial condition defined by the matrix, and registers the initial condition in the initial condition editor ([IC] tab).
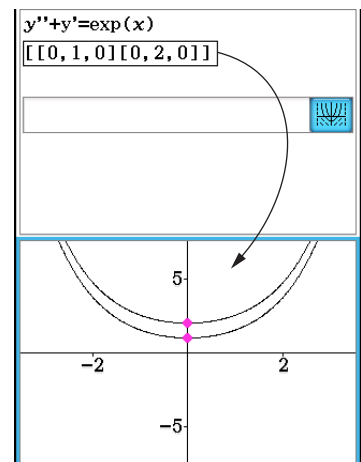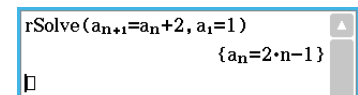
Chapter 6: Sequence Application

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 $\frac{C=}{a+b}$ to create the table.

0602

1. On the Sequence Editor window, tap $\frac{t-/x}{\Sigma an}$ 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 EXE.

0603

1. On the Sequence Editor window, tap $\frac{t-/x}{\Sigma an}$ 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_nE = $n^2 + 2n - 1$".

4. Press EXE.
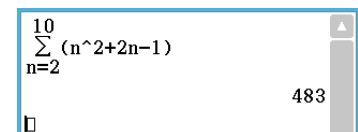
0604

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 $x$scale = 1 $x$dot: (Specify auto setting.)

$y$min = −15 $y$max = 65 $y$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).
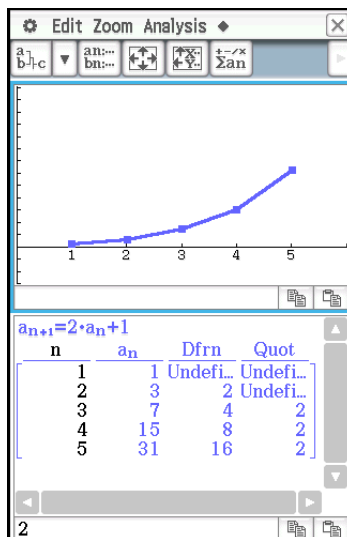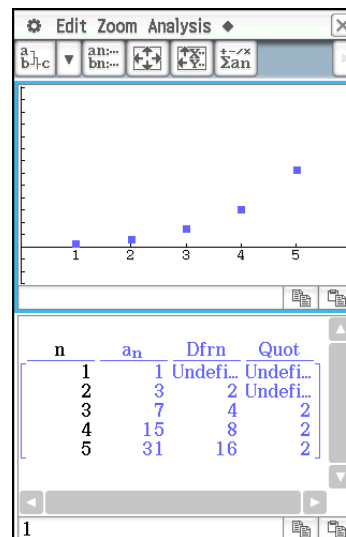

Connect type graph   Plot type graph

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 $a_{n+1} = \dfrac{a_n{}^2}{2} - 1$ 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 $x$scale = 0.2

$y$min = −1 $y$max = 0.1 $y$scale = 0.2

6. Tap ⧉ to start drawing a cobweb diagram.

7. Press [EXE] for each step of the web.
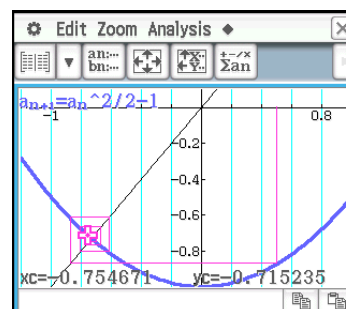
On the cobweb graph window, you can restart drawing of the cobweb diagram by selecting [Trace] on the [Analysis] menu.

Chapter 7: Statistics Application

0701

1. 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).

2. Tap ▦ to display the Set StatGraphs dialog box.

3. Configure the settings shown in the screen to the right and then tap [Set].

4. Tap ▦ to draw the scatter plot.
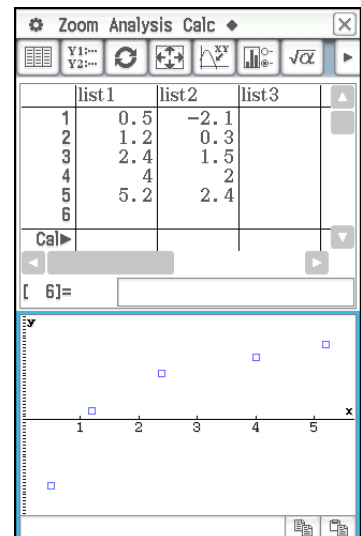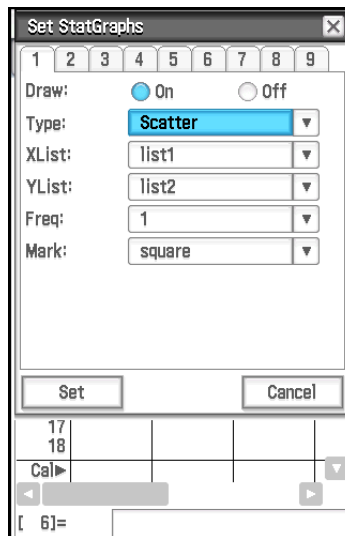
0702

1. On the Stat Editor window, tap [Calc] - [Test] .

2. Select [One-Sample Z-Test] and [Variable], and then tap [Next>>].

3. Select the μ condition [≠] and input values.
   $\mu_0 = 0$, $\sigma = 3$, $\bar{x} = 24.5$, $n = 48$

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

5. Tap ▦ to graph the results.
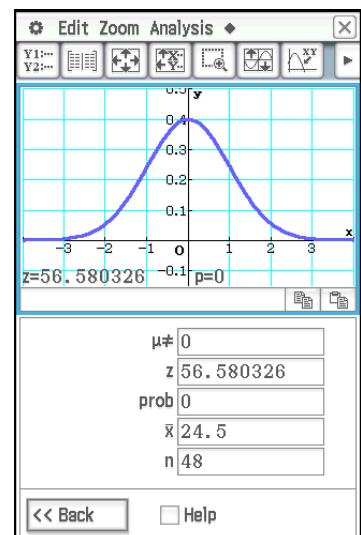
0703

1. 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}

2. Tap [Calc] - [Test].

3. Select [One-Sample Z-Test] and [List], and then tap [Next>>].

4. Select the μ condition [>] and input values.
   $\mu_0 = 120$, $\sigma = 19$

5. Select List [list1] and Freq [list2].

6. Tap [Next>>] to display the calculation results.

7. Tap ▦ to graph the results.
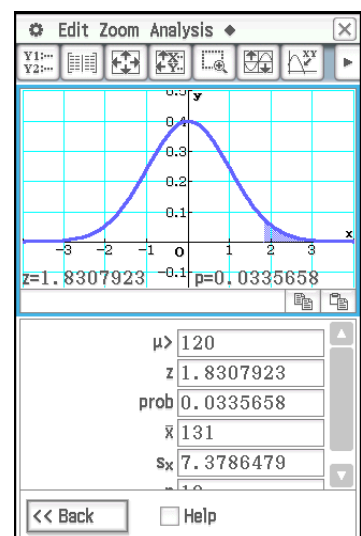
0704

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 ⊎ to graph the results.

0705

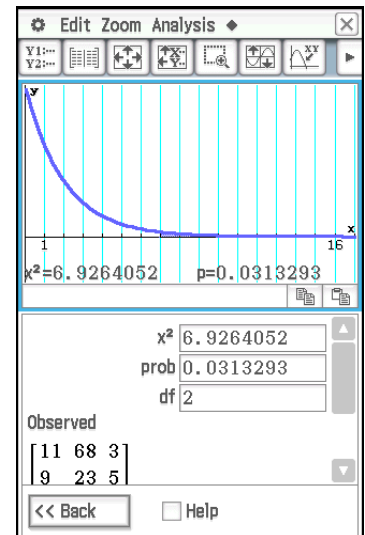1. On the Stat Editor window, tap $\sqrt{\alpha}$ to display the Main application work area window.

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 ⊎ to graph the results.
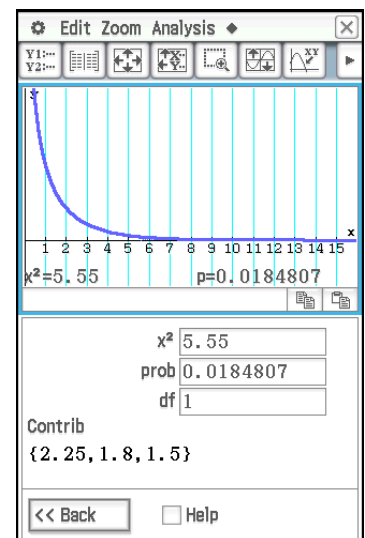
0706

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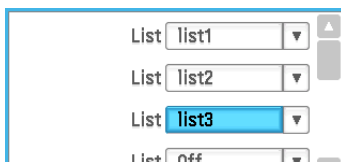
4. Tap [Next>>] to display the calculation results.

5. Tap ⊎ to graph the results.

Note: The screen shown nearby is displayed when the [Q_1, Q_3 on Data] check box on the Basic Format dialog box is cleared (unchecked).
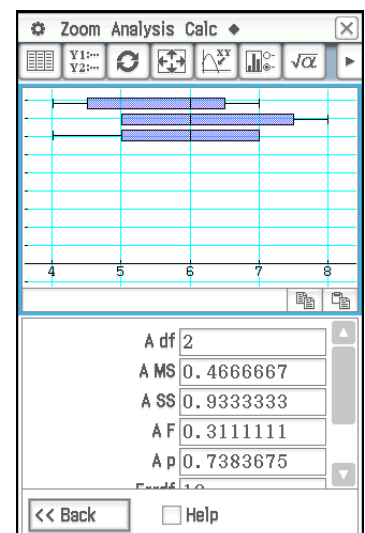
0707

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 × 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.

A df	1
A MS	18
A SS	18
A F	1.8461538
A p	0.245802
B df	1
B MS	84.5
B SS	84.5
B F	8.6666667
B p	0.042224
AB df	1
AB MS	420.5
AB SS	420.5

TwoWayANOVA

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, σ = 3).

5. Select List [list1] and Freq [1].

6. Tap [Next >>] to display the calculation results.

C-Level	0.95
σ	3
List	list1
Freq	1

Lower	296.63288
Upper	301.43379
$\bar{x}$	299.03333
s_x	1.5028861
n	6

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 ⊎ to graph the results (except for **0714**).
   - See the next page of this manual for the calculation result and graph screen.

0709 [Normal PD]
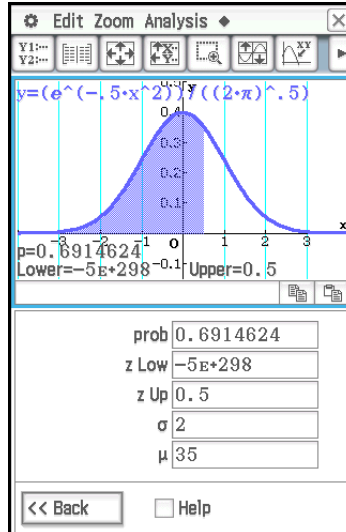
x 37.5
σ 2
μ 35

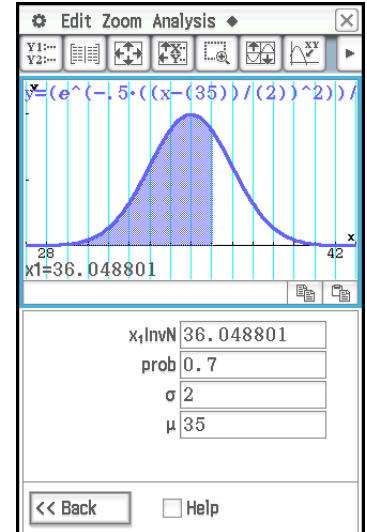y=(e^(-.5·((x-(35))/(2))^2))/

28   42
x=37.5   y=0.0913245
x=37.5

prob 0.0913245
x 37.5
σ 2
μ 35

<< Back   Help
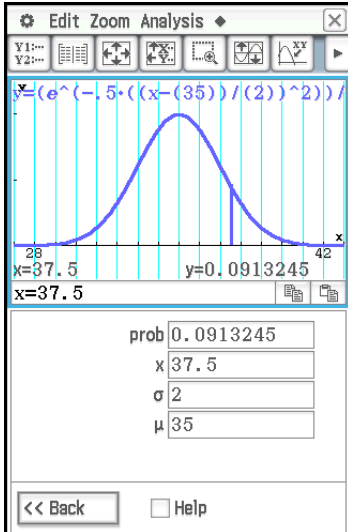
0710 [Normal CD]

Lower -∞
Upper 36
σ 2
μ 35

y=(e^(-.5·x^2))/((2·π)^.5)

0.4
0.3
0.2
0.1

-3 -2 -1 O 1 2 3
p=0.6914624 -0.1
Lower=-5ᴇ+298   Upper=0.5

prob 0.6914624
z Low -5ᴇ+298
z Up 0.5
σ 2
μ 35

<< Back   Help

0711 [Inverse Normal CD]

Tail setting Left ▼
prob 0.7
σ 2
μ 35

y=(e^(-.5·((x-(35))/(2))^2))/

28   42
x1=36.048801

x_1InvN 36.048801
prob 0.7
σ 2
μ 35

<< Back   Help

0712 [Poisson PD]

x 10
λ 6

1   21
xC=10   Fc=0.041303

prob 0.041303
x 10
λ 6

<< Back   Help

0713 [Poisson CD]

Lower 2
Upper 3
λ 2.26

3   4
p=0.4672462

prob 0.4672462
Lower 2
Upper 3
λ 2.26

<< Back   Help
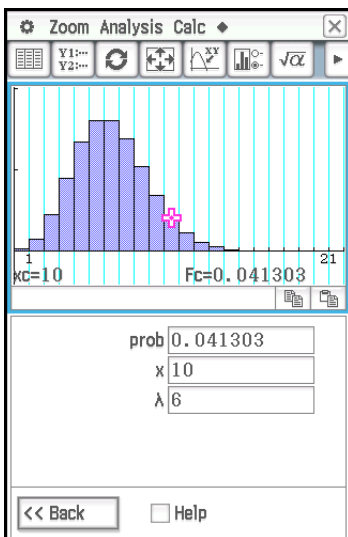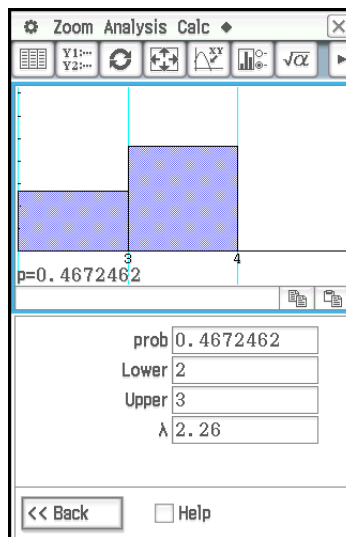
0714 [Inverse Poisson CD]

prob .8074
λ 2.26

xInv 3
prob .8074
λ 2.26

<< Back   Help

InvPoissonCD

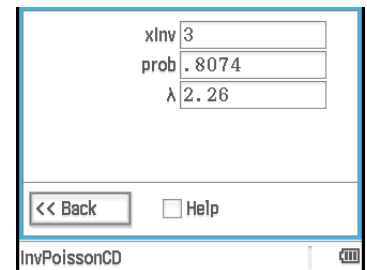**Tip:** Graphing the results of one of the following calculations may take a long time when the absolute value of the argument is large: Binomial PD, Binomial CD, Poisson PD, Poisson CD, Geometric PD, Geometric CD, Hypergeometric PD, or Hypergeometric CD calculations.

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.
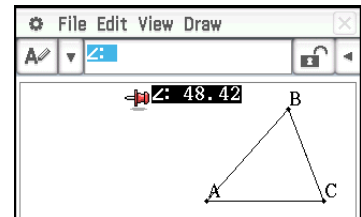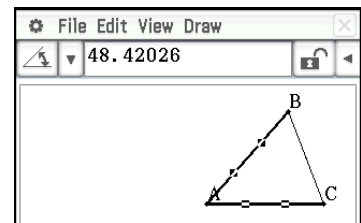
0802

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 ⌷EXE⌷.
   • 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.
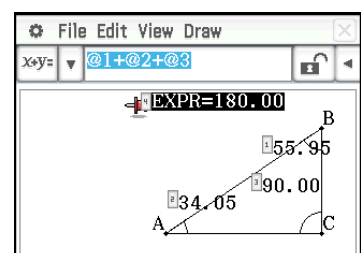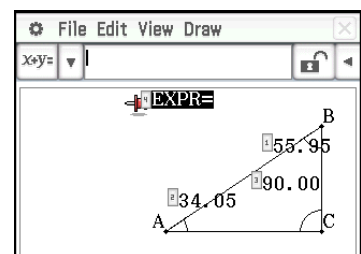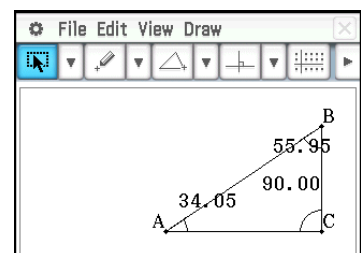
0803

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.
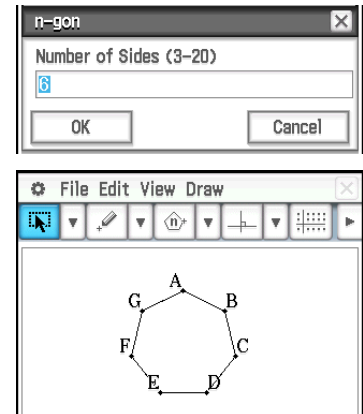
0804

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°.
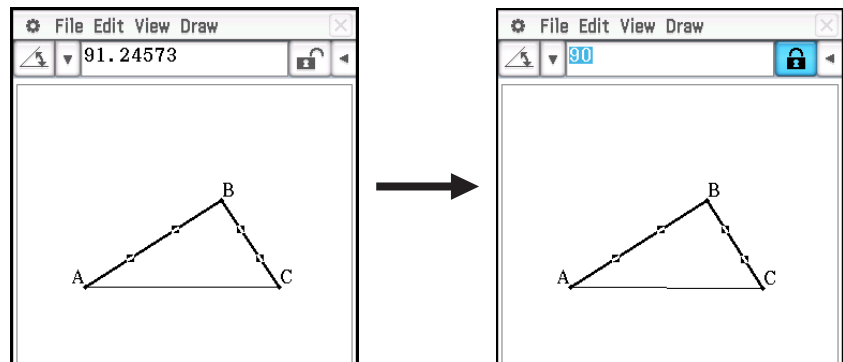
5. Tap in a blank area on the screen to deselect everything and then select the AC side.
   - This displays the measurement box, which shows the length of side AC.

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].
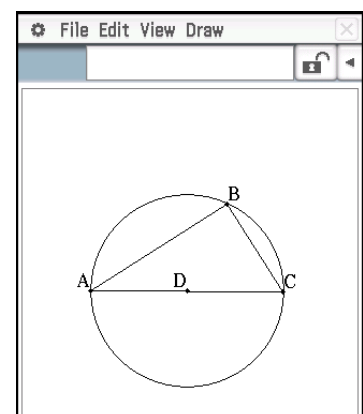
13. On the Slider Setting dialog box that appears, input 10 for **Min**, 80 for **Max**, and 10 for **Step**, and then tap [OK].

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.
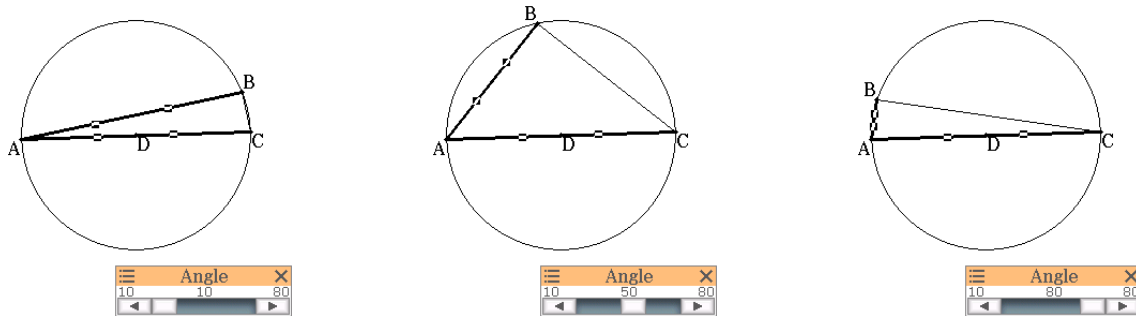
    • Instead of tapping [Auto Play], you could also tap the slider ◄ and ► buttons to change angle A manually.

15. After you are finished using the slider, tap the close button (☒) 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)].
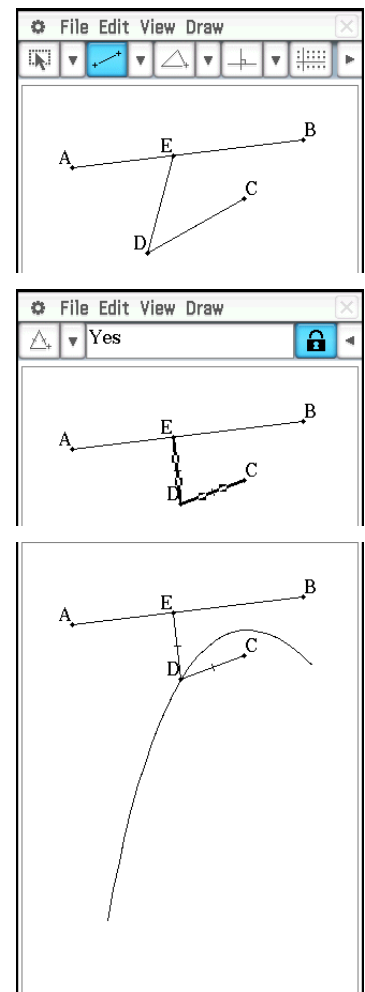
Chapter 9:
Numeric Solver Application

0901

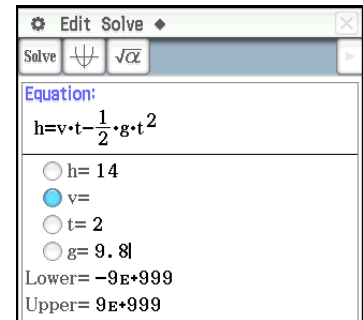1. On the Numeric Solver window, input the equation:

   $h = vt - 1/2\ gt^2$

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

   $h = 14$, $t = 2$, 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.
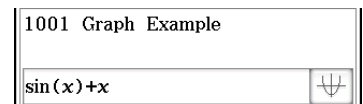
Chapter 10:
eActivity Application

1001

1. 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.

2. On the Graph window, tap ⊞ to display the Graph Editor window.

3. Enter functions to graph, and then tap ⊎ to graph the functions.

eActivity window   **Graph Editor window**
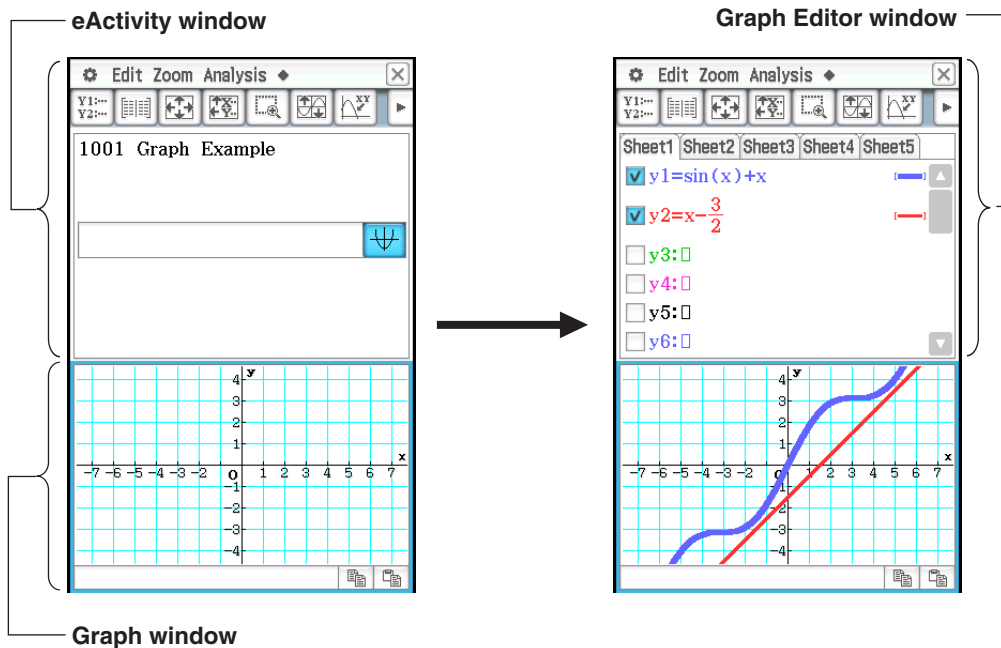
Graph window

4. After you finish performing the operation you want, tap ⊠ to close the Graph window.

5. Tap the Graph Editor window, and then tap ⊠ to return to the eActivity window.

6. Enter the title you want in the Graph strip title box.

1002

1. 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.

2. Enter text you want in the Notes window.

3. 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.
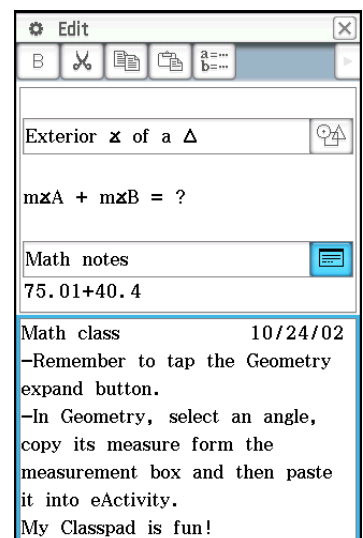
Chapter 11: Financial Application

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 × 10 years), $I\%$ = 7, PV = 0,
   PMT = −100, P/Y = 12 (month), C/Y = 12 (month)

3. Tap [FV] to obtain the future value.

|	
N	120
I%	7
PV	0
PMT	−100
FV	17308.48074
P/Y	12
C/Y	12
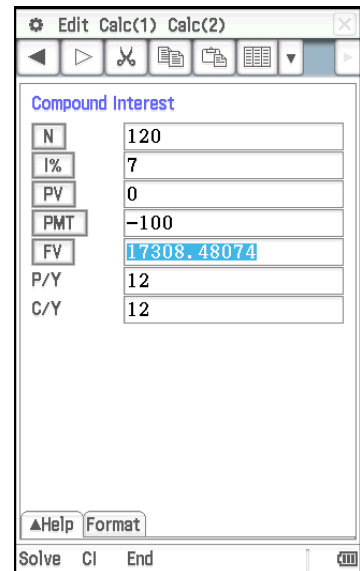
1102 Cash Flow

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?

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.

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

Cash Flow
Cash — 6 entries
I% — 10
NPV — 1065.258831
IRR
PBP
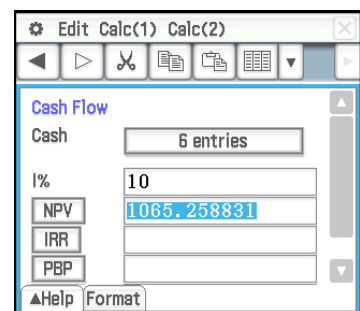
1103 Amortization

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 × 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).
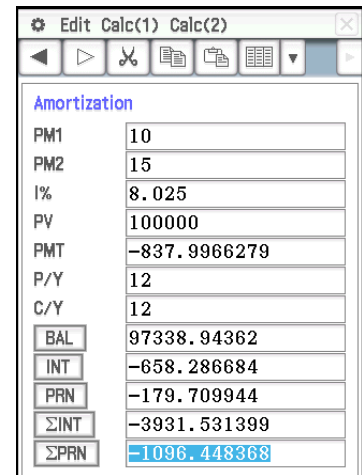
N	240
I%	8.025
PV	100000
PMT	−837.9966279
FV	0
P/Y	12
C/Y	12
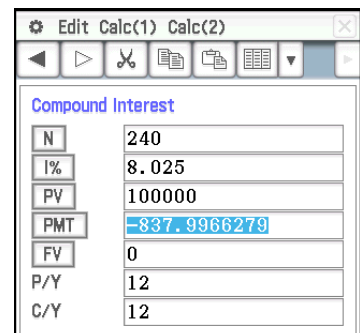
Page 1 calculation results

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 (ΣINT) from payment 10 to payment 15
- Total principal to be paid (ΣPRN) 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 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].

Page 2 calculation results

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)?
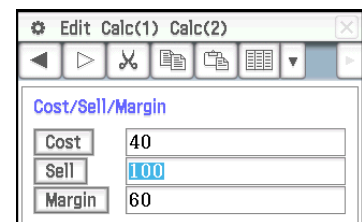
1. Tap [Calc(1)] - [Interest Conversion].

2. Input 6 for N and 5 for EFF.

3. Tap [APR] to obtain the nominal interest rate.
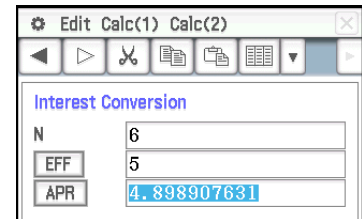
1105 **Cost/Sell/Margin**

What is the selling price ([Sell]) required to obtain a margin of profit ([Margin]) of 60% on an item that cost $40 ([Cost])?
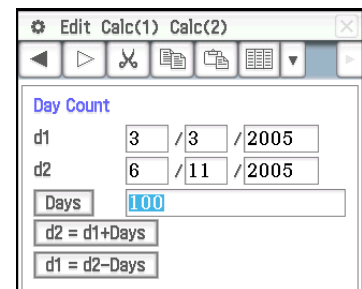
1. Tap [Calc(1)] - [Cost/Sell/Margin].

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).

First year

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.

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.

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].

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].

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].

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].

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].

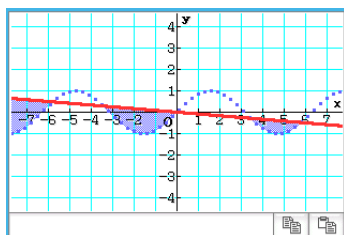# Chapter 12:
Program Application

Note: The notation in the "Program" uses □ to represent a space and ↵ for a carriage return.

1201

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

Result screen:

1202

Program:
ClrGraph ↵
ViewWindow□–15.4,15.4,2,–7.6, 7.6,2 ↵
"(x–1)^2/3^2+(y–2)^2/4^2= 1"
⇒ConicsEq ↵
DrawConics

Result screen:
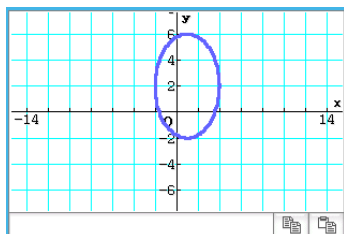
1203

Program:
DefaultSetup ↵
ClrGraph ↵
ViewWindow□0,7.7,1,–14,110, 10 ↵
GraphType□"y=" ↵
Define□y1(x)=3×x^2–2 ↵
GTSelOn□1 ↵
0⇒FStart ↵
6⇒FEnd ↵
1⇒FStep ↵
SheetActive□1 ↵
DispFTable ↵
Pause ↵
DrawFTGCon

Result screen:
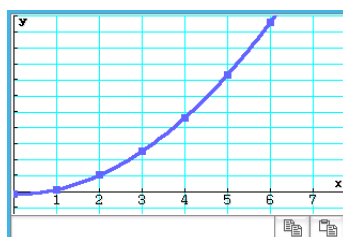
1204

Program:
DefaultSetup ↵
ViewWindow□0,6,1,–0.01,0.3,1 ↵
SeqType "$a_{n+1}a_0$" ↵
"$-3a_n{}^2+2a_n$"⇒a_{n+1} ↵
0⇒SqStart ↵
6⇒SqEnd ↵
0.01⇒a_0 ↵
DispSeqTbl ↵
Pause ↵
DrawSeqCon

Result screen:
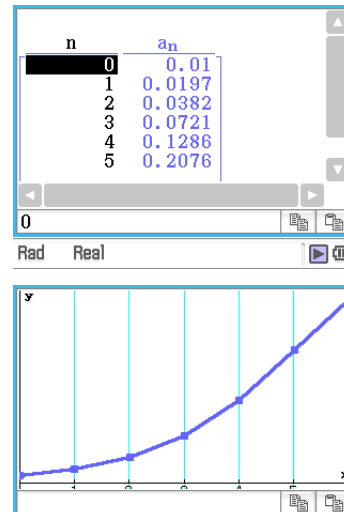
1205

Program:
{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

Result screen:
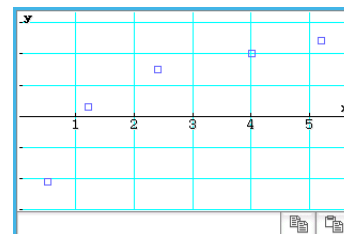
1206

Program:
{0.5,1.2,2.4,4,5.2}⇒list1 ↵
{–2.1,0.3,1.5,2,2.4}⇒list2 ↵
StatGraph□1, On, LogR, list1, list2, 1 ↵
DrawStat

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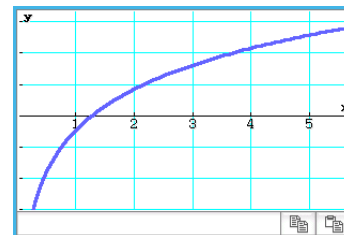
Note: MedMed, QuadR, CubicR, QuartR, LinearR, ExpR, abExpR, or PowerR can also be specified in instead of LogR for the graph type.

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 ↵
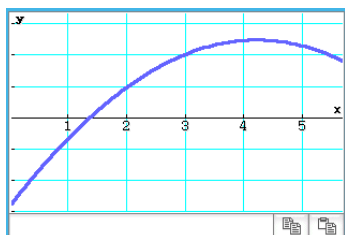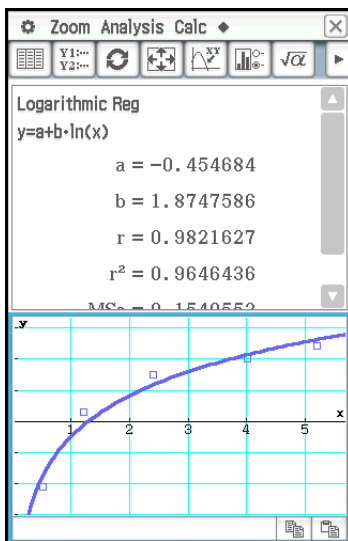StatGraph□1, On, Scatter, list1, list2, 1, Square ↵
DrawStat ↵
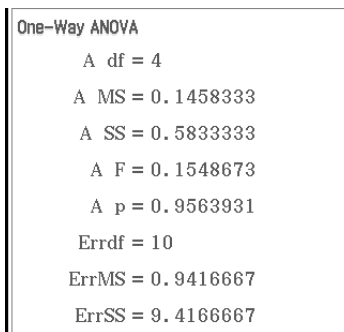LogReg□list1, list2, 1 ↵
DispStat ↵
DrawStat

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 ↵
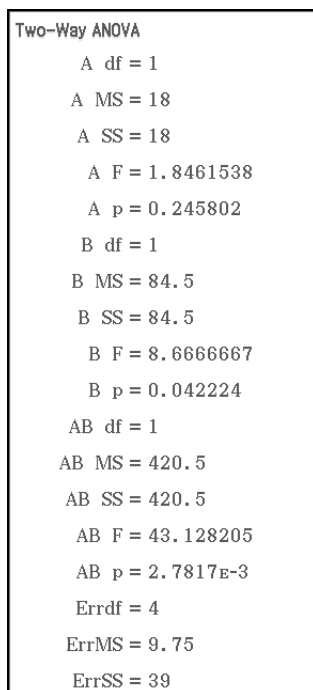OneWayANOVA□list1, list2 ↵
DispStat

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:
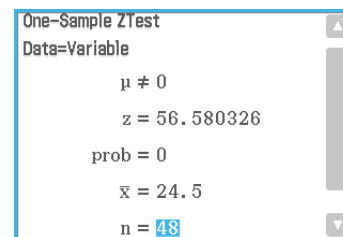
1212

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.
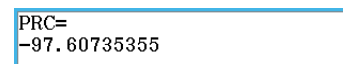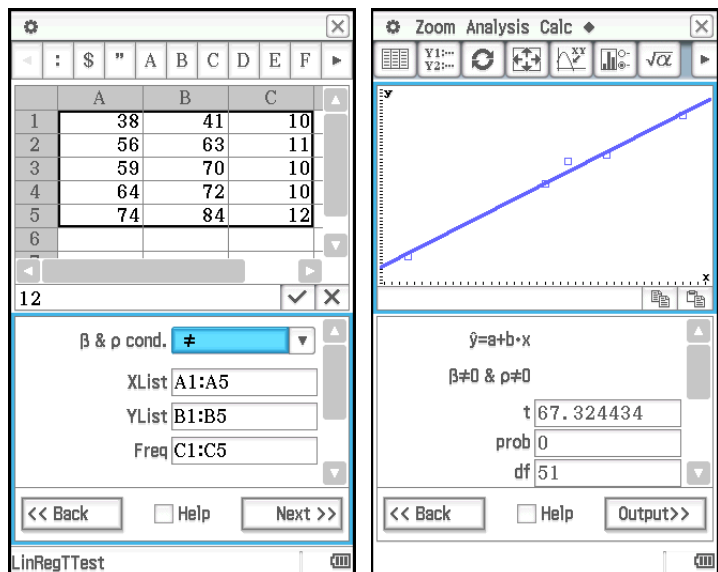
2. Tap [Calc] - [Test] - [Linear Reg *t*-Test], and then tap [Next>>].
   • This will automatically insert the cell references into the fields as shown in the nearby screen shot.

3. Tap [Next>>].

4. Tap ⊞ 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 × 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>>].
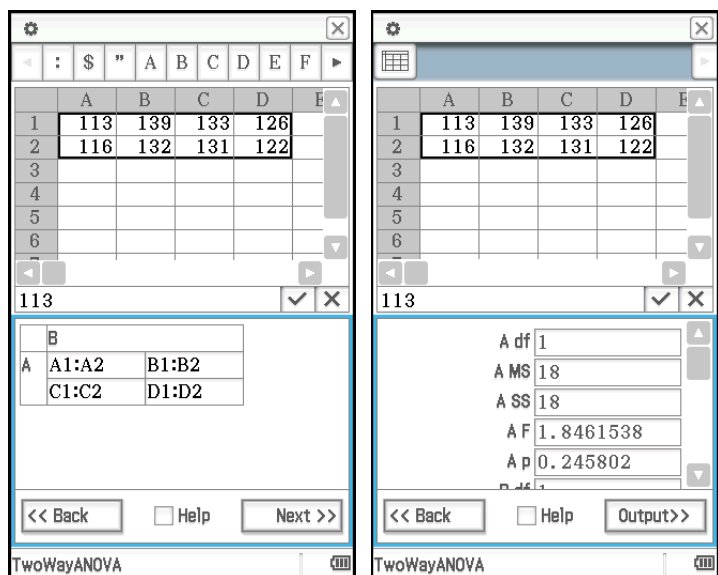
1303

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.

=cellif(A1>5,"Big","Small")
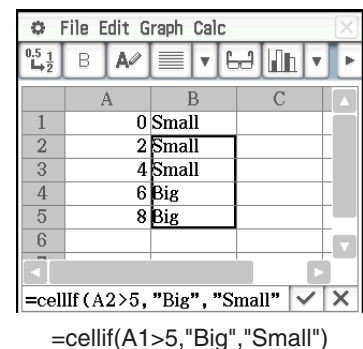
1304

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)

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)

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 $\dfrac{x^2}{2} - \dfrac{y^2}{8}$.

4. Press $\boxed{\text{EXE}}$.
   - This stores the expression you input and selects it, which is indicated by the button changing to "⬤".
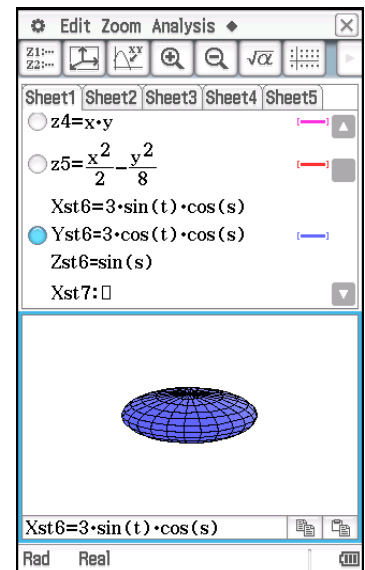
5. Tap 📈 to graph the expression.
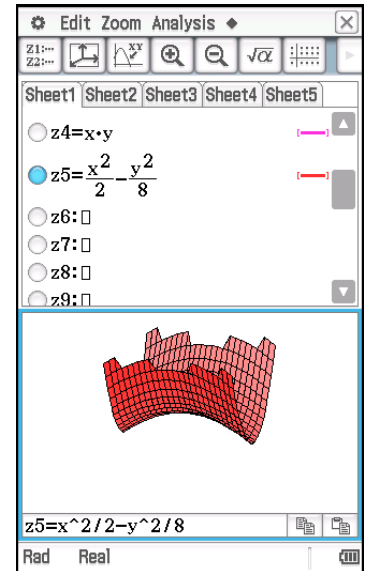
1402

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 📈 to graph the expression.

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