Dual Graph

Dual Graph lets you split the display between two different screens, which you can then use to draw different graphs at the same time. Dual Graph gives you valuable graph analysis capabilities.

• You should be familiar with the contents of "8-3 Graph Function Operations" before reading this chapter.

11-1 Before Using Dual Graph

From the Main Menu, enter the **GRAPH** Mode and set the Dual Screen setting to "Graph".

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$\boxed{\text{SHIFT}}$ $\boxed{\text{SETUP}}$ $\bigtriangledown$ $\bigtriangledown$ $\boxed{\text{F1}}$(Grph)

```
Dual Screen :Graph

Grph GtoT Off
 F1
```

$\boxed{\text{EXIT}}$

```
Graph Func  :Y=
Y1:
Y2:
Y3:
Y4:
Y5:
Y6:
SEL DEL TYPE     GMEM DRAW
F1  F2  F3       F5   F6
```

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• For further details about the function key menu at the bottom of the display, see "8-1 Before Trying to Draw a Graph".

• 8,192 bytes of memory are used whenever you set the Dual Screen setting to "Graph".

■ About Dual Graph Screen Types

The screen on the left side of the display is called the *active screen*, and the graph on the left side of the display is called the *active graph*. Conversely, the right side is the *inactive screen* containing the *inactive graph*. Any function that you execute while using Dual Graph is always applied to the active graph. To execute a function on the right-side inactive graph, you must first make it active by moving it into the active screen.
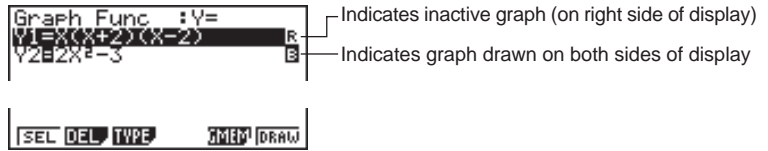
Active Screen ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Actual graph drawing is done here.
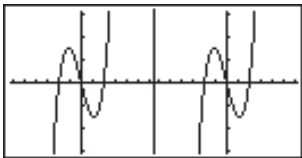
Inactive Screen ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

Use this screen to make copies of active screen graphs, and for the result of Zoom operations. You can also set different View Window parameters for the active and inactive screens.

• Indicators appear to the right of the formulas in the function memory list to tell where graphs are drawn with Dual Graph.

```
Graph Func :Y=
Y1=X(X+2)(X-2)          R
Y2=2X²-3               B
```
—Indicates inactive graph (on right side of display)

—Indicates graph drawn on both sides of display

```
SEL DEL TYPE     MEM DRAW
```

If you redraw graphs in the situation shown above, the function marked "**R**" is drawn as the inactive graph, while "**B**" is drawn using both sides of the display.

If you press F1 (SEL), the "**R**" and "**B**" indicators are cleared, and the graphs are drawn as active graphs.
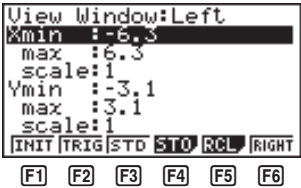
11-2 Specifying the Left and Right View Window Parameters

You can specify different View Window parameteres for the left and right sides of the graph display.

● **To specify View Window parameters**

Press [SHIFT] [F3] (V-Window) to display the View Window parameter setting screen for the active (left side) graph.

[SHIFT] [F3] (V-Window)

```
View Window:Left
Xmin :-6.3
 max  :6.3
 scale:1
Ymin :-3.1
 max  :3.1
 scale:1
INIT TRIG STD STO RCL RIGHT
```

[F1]   [F2]   [F3]   [F4]   [F5]   [F6]

P.129   [F1] (INIT) .... Initialization of View Window values

P.129   [F2] (TRIG) ...... Initialization of View Window values to match trigonometric units

P.130   [F3] (STD) .... View Window standard settings

P.130   [F4] (STO) .... Store settings in memory

P.130   [F5] (RCL) .... Recall settings from memory

     [F6] (RIGHT) ⌐ ... Swap active (left) screen and inactive (right) screen View
     [F6] (LEFT) ⌐   Window settings

P.127   • Use the procedures described under "View Window (V-Window) Settings" to input parameter values.

     • Use the following key operations to change to different screens while inputting View Window parameters for the left and right side screens.

     While the View Window parameter setting screen for the active graph is shown:

         [F6] (RIGHT) .... Displays the inactive graph View Window parameter setting screen

While the View Window parameter setting screen for the inactive graph is shown:

 F6 (LEFT) .... Displays the active graph View Window parameter
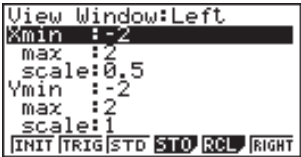   setting screen

11-3 Drawing a Graph in the Active Screen

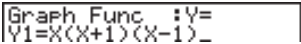You can draw graphs only in the active screen. You can then copy or move the graph to the inactive screen.

● **Drawing a graph in the active screen**

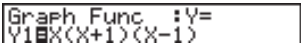**Example** **To draw the graph of $y = x\,(x + 1)\,(x - 1)$**
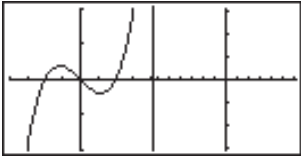
Use the following View Window parameters:

```
View Window:Left
Xmin :-2
 max  :2
 scale:0.5
Ymin :-2
 max  :2
 scale:1
INIT TRIG STD STO RCL RIGHT
```

Input the function.

$\boxed{\text{X,}\theta\text{,T}}$ $\boxed{(}$ $\boxed{\text{X,}\theta\text{,T}}$ $\boxed{+}$ $\boxed{1}$ $\boxed{)}$
$\boxed{(}$ $\boxed{\text{X,}\theta\text{,T}}$ $\boxed{-}$ $\boxed{1}$ $\boxed{)}$

```
Graph Func  :Y=
Y1=X(X+1)(X-1)_
```

Store the function.

$\boxed{\text{EXE}}$

```
Graph Func  :Y=
Y1▯X(X+1)(X-1)
```

```
SEL DEL TYPE      GMEM DRAW
                       F6
```

Draw the graph.

$\boxed{\text{F6}}$ (DRAW) or $\boxed{\text{EXE}}$

11-4   Displaying a Graph in the Inactive Screen

There are two methods you can use to display a graph in the inactive screen. You can copy a graph from the active screen to the inactive screen, or you can move the graph from the active screen to the inactive screen. In both cases, you must first draw the graph in the left-side active screen.

■ Before Displaying a Graph in the Inactive Screen

After drawing a graph in the active screen, press OPTN, and the Dual Graph function menu appears at the bottom of the display.

OPTN

COPY SWAP PICT
F1   F2   F3

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F1 (COPY) .... Copies active graph to inactive screen

F2 (SWAP) .... Switches active screen and inactive screen

F3 (PICT) ...... Picture function

■ Copying the Active Graph to the Inactive Screen

Example   To draw the graph for $y = x (x + 1) (x – 1)$ on the active screen and the inactive screen

Use the following View Window parameters:

Active (Left) Screen
View Window parameters

```
View Window:Left
Xmin :-2
 max :2
 scale:0.5
Ymin :-2
 max :2
 scale:1
INIT TRIG STD STO RCL RIGHT
```

Inactive (Right) Screen
View Window parameters

```
View Window:Right
Xmin :-4
 max :4
 scale:1
Ymin :-3
 max :3
 scale:1
INIT TRIG STD STO RCL LEFT
```

Assume that the function being graphed is stored in memory area Y1.

```
Graph Func :Y=
Y1=X(X+1)(X-1)

SEL DEL TYPE     JMEM DRAW
                   F6
```
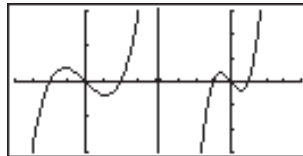
Draw the graph in the active screen.

F6 (DRAW)
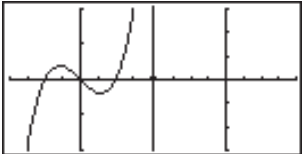
Copy the graph to the inactive (right) screen.
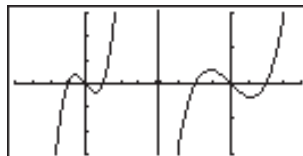
[OPTN] [F1] (COPY)

• The graph is reproduced using the inactive screen View Window parameters.

■ Switching the Contents of the Active and Inactive Screens

Example   **To switch the screens produced by the preceding example**

Switch the screens.

[OPTN] [F2] (SWAP)

• Note that using [F2] (SWAP) to switch the screens also switches their View Window parameters.

■ Drawing Different Graphs on the Active Screen and Inactive Screen

Example   **To draw the graphs of the following functions on the screens noted:**

Active Screen: $y = x \, (x + 1) \, (x - 1)$

Inactive Screen: $y = 2x^2 - 3$

Use the View Window parameters shown below.

Active (Left) Screen
View Window parameters

Inactive (Right) Screen
View Window parameters

Assume that the functions being graphed are stored in memory areas Y1 and Y2.

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Select the function for the graph that you want to end up in the inactive (right) screen.
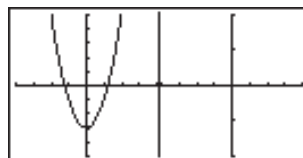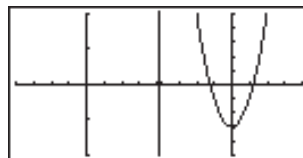
<div align="right">

F1 (SEL)

</div>

```
Graph Func  :Y=          Graph Func  :Y=
Y1=X(X+1)(X-1)      B     Y1=X(X+1)(X-1)
Y2=2X²-3                  Y2=2X²-3

SEL DEL TYPE   GMEM DRAW  SEL DEL TYPE   GMEM DRAW
```

F1   F6

Draw the graph in the active screen.

F6 (DRAW)

Swap the screens so the graph is on the inactive (right) screen.

OPTN F2 (SWAP)

Select the function for the graph that you want in the now-empty active (left) screen.

AC F1 (SEL)

```
Graph Func  :Y=
Y1=X(X+1)(X-1)
Y2=2X²-3           R

SEL DEL TYPE   GMEM DRAW
```

F6

Draw the graph.

F6 (DRAW)
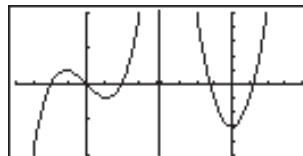
• At this point, you could perform a copy operation and superimpose the active graph over the inactive graph.

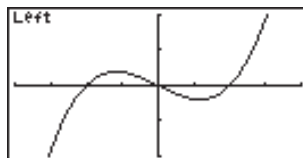OPTN F1(COPY)
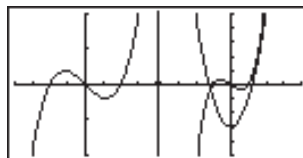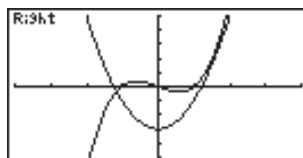

• Pressing SHIFT F6 (G ↔ T) lets you switch between display of the active and inactive graphs, using the entire display for each.

SHIFT F6(G ↔ T)

SHIFT F6(G ↔ T)

SHIFT F6(G ↔ T)

■ Other Graph Functions with Dual Graph

After drawing a graph using Dual Graph, you can use the trace, zoom, sketch and scroll functions. Note, however, that these functions are available only for the active (left) graph. For details on using these functions, see "8-6 Other Graphing Functions".

• To perform any of the above operations on the inactive graph, first move the inactive graph to the active screen.

• The graph screen will not scroll while a trace operation is being performed on the active graph.

The following shows some example operations using the zoom function.

Example 1   To use box zoom to enlarge the graph of $y = x (x + 1) (x - 1)$

Use the following View Window parameters for the active graph.
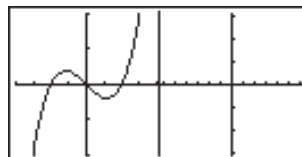
```
View Window:Left
Xmin  :-2
 max  :2
 scale:0.5
Ymin  :-2
 max  :2
 scale:1
INIT TRIG STD STO RCL RIGHT
```

Assume that the function is already stored in memory area Y1.

```
Graph Func  :Y=
Y1=X(X+1)(X-1)


SEL DEL TYPE      GMEM DRAW
```
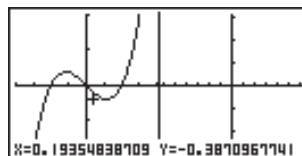F6

Draw the graph.

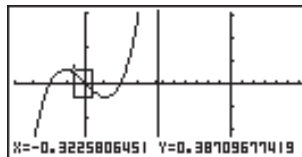F6 (DRAW) or EXE

Specify one corner of the area to be enlarged.
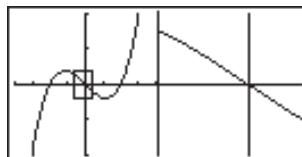
SHIFT F2 (Zoom) F1 (BOX)
⊙ ~ ⊙ ⊛ ~ ⊛ EXE

• Use the cursor keys to move the pointer to the location you want.

X=0.19354838709 Y=-0.3870967741

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Move the pointer to the other corner of the area to be enlarged.

Ⓐ ~ Ⓐ◀ ~ ◀

X=-0.3225806451 Y=0.38709677419

Enlarge the graph.

EXE

• The View Window parameters of the inactive screen are always changed by a Zoom operation, so if there is a graph already on the inactive screen, it is cleared before the result of the Zoom operation is drawn there.