

Chapter 15



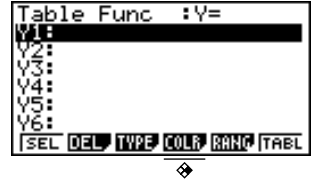
Table & Graph

With Table & Graph, you can generate tables of discrete data from functions and recursion formulas, and then use the values for graphing. Because of this, Table & Graph makes it easy to grasp the nature of numeric tables and recursion formulas.

- 15-1 Before Using Table & Graph**
- 15-2 Storing a Function and Generating a Numeric Table**
- 15-3 Editing and Deleting Functions**
- 15-4 Editing Tables and Drawing Graphs**
- 15-5 Copying a Table Column to a List**

15-1 Before Using Table & Graph

First select the **TABLE** icon on the Main Menu and then enter the TABLE Mode. When you do, the table function list appears on the display.



- {SEL} ... {numeric table generation/non-generation status}
- {DEL} ... {function delete}
- {TYPE} ... {function type specification}
- {COLR} ... {graph color specification}
- {RANG} ... {table range specification screen}
- {TABL} ... {start numeric table generation}

• Note that the {RANG} item does not appear when a list name is specified for the Variable item in the set up screen.



15-2 Storing a Function and Generating a Numeric Table

•To store a function

Example To store the function $y = 3x^2 - 2$ in memory area Y1

Use \blacktriangle and \blacktriangledown to move the highlighting in the TABLE Mode function list to the memory area where you want to store the function. Next, input the function and press $\boxed{\text{EXE}}$ to store it.

■ Variable Specifications

There are two methods you can use to specify value for the variable x when generating a numeric table.

• Table range method

With this method, you specify the conditions for the change in value of the variable.

• List

With this method, you substitute the values contained in a previously created list for the value of the variable.

•To generate a table using a table range

Example To generate a table as the value of variable x changes from -3 to 3 , in increments of 1

$\boxed{\text{F5}}$ (RANG)
 $\boxed{\leftarrow}$ $\boxed{3}$ $\boxed{\text{EXE}}$ $\boxed{3}$ $\boxed{\text{EXE}}$ $\boxed{1}$ $\boxed{\text{EXE}}$

```
Table Range
X
Start:-3
End :3
Pitch:1
```

The numeric table range defines the conditions under which the value of variable x changes during function calculation.

Start Variable x start value
End Variable x end value
pitch Variable x value change

After specifying the table range, press $\boxed{\text{EXIT}}$ to return to the function list.

● **To generate a table using a list**

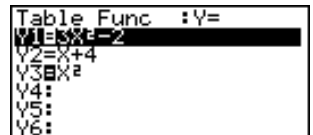
1. In the TABLE Mode, display the set up screen.
2. Highlight Variable and then press **F2** (LIST) to display the list menu.
3. Select the list you want to use.
 - To select List 6, for example, press **F6** (List6). This causes the setting of the Variable item of the set up screen to change to List 6.
4. After specifying the list you want to use, press **EXIT** to return to the previous screen.
 - Note that the {RANG} item of the TABLE Mode function list does not appear when a list name is specified for the Variable item of the set up screen.

■ **Generating a Table**

Example To generate a table of values for the functions stored in memory areas Y1 and Y3 of the TABLE Mode function list

Use **▲** and **▼** to move the highlighting to the function you want to generate a table for and press **F1** (SEL) to select it.

The “=” sign of selected functions is highlighted on the screen. To deselect a function, move the cursor to it and press **F1** (SEL) again.



Press **F6** (TABL) or **EXE** to generate a numeric table using the functions you selected. The value of variable x changes according to the range or the contents of the list you specified.

| X | Y1 | Y3 |
|----|----|----|
| -2 | 25 | 9 |
| -2 | 10 | 4 |
| -1 | 1 | 1 |
| 0 | -2 | 0 |

FORM DEL ROW G·CON G·PLT -3

Each cell can contain up to six digits, including negative sign.

You can use cursor keys to move the highlighting around the table for the following purposes.

- To display the selected cell's value at the bottom of the screen, using the calculator's current number of decimal place, number of significant digit, and exponential display range settings.
- To scroll the display and view parts of the table that do not fit in the display.
- To display at the top of the screen the scientific function that produced the value in the selected cell (in columns Y1, Y2, etc.)
- To change x variable values by replacing values in column X.

Press **[F1]** (FORM) to return to the TABLE Mode function list.



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● **To generate a differential numeric table**

Changing the setting of set up screen's Derivative item to "On" causes a numeric table that includes the derivative to be displayed whenever you generate a numeric table.

Locating the cursor at a differential coefficient displays "dy/dx" in the top line to indicate differential.

| $\frac{dy}{dx}$ | Y1 | Y'1 | Y2 |
|-----------------|----|-----|-----|
| -3 | 25 | -1E | 9 |
| -2 | 10 | -12 | 4 |
| -1 | 1 | -6 | 1 |
| 0 | -2 | 0 | 0 |
| | | | -18 |

FORM DEL ROW G-COM G-PLT

- An error occurs if a graph for which a range is specified or an overwrite graph is included among the graph expressions.

■ **Specifying the function type**

You can specify a function as being one of three types.

- Rectangular coordinate (Y=)
- Polar coordinate (r=)
- Parametric (Parm)

1. To display the menu of function types, press **[F3]** (TYPE) while the function list is on the screen.
2. Press the function key that corresponds to the function type you want to specify.
 - When you generate a numeric table, a table is generated only for the function type you specify here.

15-3 Editing and Deleting Functions

•To edit a function

Example To change the function in memory area Y1 from $y = 3x^2 - 2$ to $y = 3x^2 - 5$

Use \blacktriangle and \blacktriangledown to move the highlighting in the TABLE Mode list to the function you want to edit.

```
Table Func :Y=
Y1=3X^2
```

Use \blacktriangleleft and \blacktriangleright to move the cursor to the location of the change.

\blacktriangleleft \blacktriangleleft \blacktriangleleft \blacktriangleleft \blacktriangleleft $\boxed{5}$

```
Table Func :Y=
Y1=3X^2-5
```

$\boxed{\text{EXE}}$

```
Table Func :Y=
Y1=3X^2-5
Y2=X+4
```

$\boxed{\text{F6}}$ (TABL)

| X | Y1 | Y2 | Y3 |
|----|----|----|----|
| -2 | 22 | 9 | |
| -1 | 1 | 4 | |
| 0 | -5 | 1 | |
| | | | 0 |

-3

FORM DEL ROW G-COM G-PLT



- The Function Link Feature automatically reflects any changes you make to functions in the TABLE Mode list, in the GRAPH Mode and DYNA Mode lists.

•To delete a function

1. Use \blacktriangle and \blacktriangledown to move the highlighting to the function you want to delete and then press $\boxed{\text{F2}}$ (DEL).
2. Press $\boxed{\text{F1}}$ (YES) to delete the function or $\boxed{\text{F6}}$ (NO) to abort the operation without deleting anything.

15-4 Editing Tables and Drawing Graphs



You can use the table menu to perform any of the following operations once you generate a table.

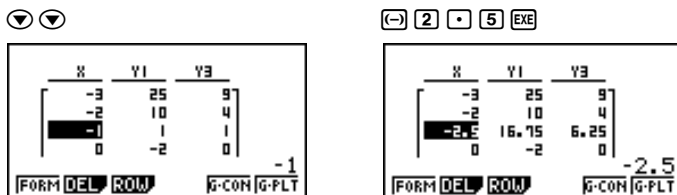
- Change the values of variable x
- Edit (delete, insert, and append) rows
- Delete a table
- Draw a connect type graph
- Draw a plot type graph

While the Table & Graph menu is on the display, press $\boxed{F6}$ (TABL) to display the table menu.

- {FORM} ... {display function list}
- {DEL} ... {delete table}
- {ROW} ... {display menu of row operations}
- {G-CON}/{G-PLT} ... {connected type}/{draw plot type} graph draw

● To change variable values in a table

Example To change the value in Column x , Row 3 of the table generated on page 208 from -1 to -2.5



- When you change a variable value in Column x , all values in the columns to the right are recalculated and displayed.
- If you try to replace a value with an illegal operation (such as division by zero), an error occurs and the original value remains unchanged.
- You cannot directly change any values in the other (non- x) columns of the table.

■ Row Operations

The following menu appears whenever you press **F3** (ROW) while the table menu is on the display.

- {DEL} ... {delete row}
- {INS} ... {insert row}
- {ADD} ... {add row}

●To delete a row

Example To delete Row 2 of the table generated on page 208

F3 (ROW) ▼

| X | Y1 | Y2 |
|----|----|----|
| -3 | 25 | 9 |
| -2 | 10 | 4 |
| -1 | 1 | 1 |
| 0 | -2 | 0 |

-2

F1

F1 (DEL)

| X | Y1 | Y2 |
|----|----|----|
| -3 | 25 | 9 |
| -1 | 1 | 1 |
| 0 | -2 | 0 |
| 1 | 1 | 1 |

-1

●To insert a row

Example To insert a new row between Rows 1 and 2 in the table generated on page 208

F3 (ROW) ▼

| X | Y1 | Y2 |
|----|----|----|
| -3 | 25 | 9 |
| -2 | 10 | 4 |
| -1 | 1 | 1 |
| 0 | -2 | 0 |

-2

F2

F2 (INS)

| X | Y1 | Y2 |
|----|----|----|
| -3 | 25 | 9 |
| -2 | 10 | 4 |
| -2 | 10 | 4 |
| -1 | 1 | 1 |

-2

●To add a row

Example To add a new row below Row 7 in the table generated on page 208

F3 (ROW) ▼ ▼ ▼ ▼ ▼ ▼

| X | Y1 | Y2 |
|---|----|----|
| 0 | -2 | 0 |
| 1 | 1 | 1 |
| 2 | 10 | 4 |
| 2 | 25 | 9 |

3

F3

F3 (ADD)

| X | Y1 | Y2 |
|---|----|----|
| 1 | 1 | 1 |
| 2 | 10 | 4 |
| 2 | 25 | 9 |
| 2 | 25 | 9 |

3

■ Deleting a Table

1. Display the table you want to delete and then press **F2** (DEL).
2. Press **F1** (YES) to delete the table or **F6** (NO) to abort the operation without deleting anything.

■ Graphing a Function

Before drawing a function graph, you must first specify the following.

- Graph color (blue, orange, green)
- Draw/non-draw status of the function

**●To specify the graph color**

The default color for a graph is blue. Use the following procedure to change the graph color to orange or green.

1. Display the function list and then use **▲** and **▼** to highlight the function whose graph color you want to change.
2. Press **F4** (COLR).
3. Press the function key that corresponds to the color you want to specify.
 - **{Blue}/{Orng}/{Grn}** .. {blue}/{orange}/{green}

●To specify the draw/non-draw status of a formula

There are two options for the draw/non-draw status of a function graph.

- For the selected function only
- Overlay the graphs for all functions



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To specify the draw/non-draw status, use same procedure as that for specifying table generation/non-generation status.

● **To graph only a selected function**

Example To graph $y = 3x^2 - 2$, which is stored in memory area Y1, as a connect type graph.

Use the following View Window parameters.

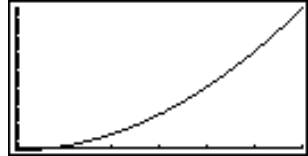
Xmin = 0 **Ymin = -2**
Xmax = 6 **Ymax = 106**
Xscale = 1 **Yscale = 2**

▼ **F1** (SEL)
 (Specifies graph non-draw.)

No highlighting

```
Table Func :Y=
Y1=3X^2-2
Y2=X+4
```

F6 (TABL) **F5** (G·CON)
 (Specifies connect type graph.)

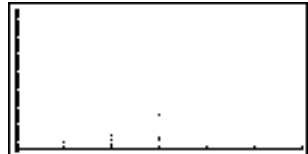


● **To graph all of the functions**

Example To use the values in the numeric table generated using the Table Range and the View Window parameters from the previous example to graph all functions stored in memory as plot type graphs.

F6 (TABL) **F6** (G·PLT)
 (Specifies plot type graph.)

```
Table Func :Y=
Y1=3X^2-2
Y2=X+4
```



- After you graph a function, you can press **SHIFT** **F6** (G↔T) or **AC** to return to the function's numeric table.
- After graphing a function, you can use the trace, zoom, sketch functions. For details, see "8-6 Other Graphing Functions".



●To graph a function using Dual Screen

Selecting “T+G” for the Dual Screen item of the set up screen makes it possible to display both the graph and its numeric table of values.

Example To graph $y = 3x^2 - 2$ in memory area Y1, displaying both the graph and its table

Use the same View Window parameters as in the example on page 214.

Display the set up screen and specify “T+G” for Dual Screen. Press **EXIT**.

F6 (TABL)

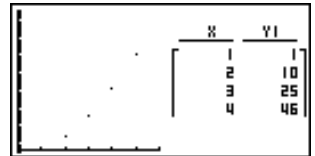
(Shows the table.)

| X | Y1 |
|---|----|
| 1 | 1 |
| 2 | 10 |
| 3 | 25 |
| 4 | 46 |

F6

F6 (G-PLT)

(Draws plot type graph.)



- Pressing **SHIFT F6** (G↔T) causes the graph on the left side of the Dual Screen to fill the entire display. Note that you cannot use the sketch function while a graph is displayed using **SHIFT F6** (G↔T).

15-5 Copying a Table Column to a List

A simple operation lets you copy the contents of a numeric table column into a list.

•To copy a table to a list

Example To copy the contents of Column x into List 1

OPTN F1 (LIST) F2 (LMEM)

| X | Y1 | Y3 |
|----|----|----|
| -2 | 25 | 9 |
| -2 | 10 | 4 |
| -1 | 1 | 1 |
| 0 | -2 | 0 |

List1 List2 List3 List4 List5 List6

F1

- You can select any row of the column you want to copy.

Press the function key that corresponds the list you want to copy to.

F1 (List1)

| X | Y1 | Y3 |
|----|----|----|
| -2 | 25 | 9 |
| -2 | 10 | 4 |
| -1 | 1 | 1 |
| 0 | -2 | 0 |

List LMEM Dim Fill Seq D