

Chapter

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Basic Operation

- 1-1 Before Starting Calculations...
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1-1 Before Starting Calculations...

Before performing a calculation for the first time, you should use the set up screen to specify the angle unit and display format.

■ Setting the Angle Unit (Angle)

1. Display the set up screen and use the \blacktriangle and \blacktriangledown keys to highlight "Angle".
2. Press the function key for the angle unit you want to specify.
 - **{Deg}/{Rad}/{Gra}** ... {degrees}/{radians}/{grads}
3. Press **[EXIT]** to return to the screen that was on the display when you started the procedure.

- The relationship between degrees, grads, and radians is shown below.

$$360^\circ = 2\pi \text{ radians} = 400 \text{ grads}$$

$$90^\circ = \pi/2 \text{ radians} = 100 \text{ grads}$$

■ Setting the Display Format (Display)

1. Display the set up screen and use the \blacktriangle and \blacktriangledown keys to highlight "Display".
2. Press the function key for the item you want to set.
 - **{Fix}/{Sci}/{Norm}/{Eng}** ... {fixed number of decimal places specification}/
{number of significant digits specification}/{exponential format display range toggle}/{Engineering Mode}
3. Press **[EXIT]** to return to the screen that was on the display when you started the procedure.

● To specify the number of decimal places (Fix)

Example To specify two decimal places

[F1] (Fix) **[F3]** (2)

Display :Fix2

Press the function key that corresponds to the number of decimal places you want to specify ($n = 0$ to 9).

- Displayed values are rounded off to the number of decimal places you specify.

• To specify the number of significant digits (Sci)

Example To specify three significant digits

$\boxed{F2}$ (Sci) $\boxed{F4}$ (3)

Display :Sci3

Press the function key that corresponds to the number of significant digits you want to specify ($n = 0$ to 9).

- Displayed values are rounded off to the number of significant digits you specify.
- Specifying 0 makes the number of significant digits 10.

• To specify the exponential display range (Norm 1/Norm 2)

Press $\boxed{F3}$ (Norm) to switch between Norm 1 and Norm 2.

Norm 1: $10^{-2} (0.01) > |x|, |x| \geq 10^{10}$

Norm 2: $10^{-9} (0.000000001) > |x|, |x| \geq 10^{10}$

• To specify the engineering notation display (Eng)

Press $\boxed{F4}$ (Eng) to switch between engineering notation and standard notation. The indicator "E" is on the display while engineering notation is in effect.

The following are the 11 engineering notation symbols used by this calculator.

Symbol	Meaning	Unit	Symbol	Meaning	Unit
E	Exa	10^{18}	m	milli	10^{-3}
P	Peta	10^{15}	μ	micro	10^{-6}
T	Tera	10^{12}	n	nano	10^{-9}
G	Giga	10^9	p	pico	10^{-12}
M	Mega	10^6	f	femto	10^{-15}
k	kilo	10^3			

- The engineering symbol that makes the mantissa a value from 1 to 1000 is automatically selected by the calculator when engineering notation is in effect.

■ Inputting Calculations

When you are ready to input a calculation, first press **AC** to clear the display. Next, input your calculation formulas exactly as they are written, from left to right, and press **EXE** to obtain the result.

Example 1 $2 + 3 - 4 + 10 =$

AC **2** **+** **3** **-** **4** **+** **1** **0** **EXE** 2+3-4+10 11

Example 2 $2(5 + 4) \div (23 \times 5) =$

AC **2** **(** **5** **+** **4** **)** **÷**
(**2** **3** **×** **5** **)** **EXE** 2(5+4)/(23×5)
0.1565217391

■ Calculation Priority Sequence

This calculator employs true algebraic logic to calculate the parts of a formula in the following order:

- ① Coordinate transformation Pol (x, y), Rec (r, θ)
 Differentials, quadratic differentials, integrations, Σ calculations
 $d/dx, d^2/dx^2, \int dx, \Sigma, \text{Mat, Solve, FMin, FMax, List} \rightarrow \text{Mat, Fill, Seq, SortA, SortD, Min, Max, Median, Mean, Augment, Mat} \rightarrow \text{List, List}$
 ALGBR Mode unique commands
 expand(, factor(, tExpand(, tCollect(, \int (, diff(, solve(, tanLine(, collect(, combine(, sequence(, sumSeq(, expToTrig(, trigToExp(, signum(
- ② Type A functions
 With these functions, the value is entered and then the function key is pressed.
 $x^2, x^{-1}, x!, x^{\circ}, x^{\prime}$, ENG symbols
- ③ Power/root $^{\wedge}(x^y), \sqrt[x]{}$
- ④ Fractions a^b/c
- ⑤ Abbreviated multiplication format in front of π , memory name, or variable name.
 $2\pi, 5A, X \text{ min, F Start, etc.}$
- ⑥ Type B functions
 With these functions, the function key is pressed and then the value is entered.
 $\sqrt{}, \sqrt[3]{}, \log, \ln, e^x, 10^x, \sin, \cos, \tan, \sin^{-1}, \cos^{-1}, \tan^{-1}, \sinh, \cosh, \tanh, \sinh^{-1}, \cosh^{-1}, \tanh^{-1}, (-), d, h, b, o, \text{Neg, Not, Det, Trn, Dim, Identity, Sum, Prod, Cuml, Percent, } \Delta \text{List}$
- ⑦ Abbreviated multiplication format in front of Type B functions
 $2\sqrt{3}, A \log 2, \text{etc.}$
- ⑧ Permutation, combination nPr, nCr
- ⑨ $\times, / (\div)$
- ⑩ $+, -$

⑪ Relational operator

=, ≠, >, <, ≥, ≤

⑫ And, and

⑬ Or, or, xor, xnor

- Execution is normally performed from left to right, except in the following cases when it is performed from right to left.

- When functions with the same priority are used in series:

$$e^{\ln\sqrt{120}} \rightarrow e^{\{\ln(\sqrt{120})\}}$$

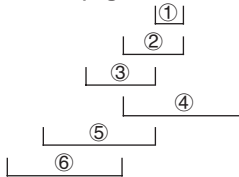
- When power calculations are used in series in the ALGBR Mode:

$$[5^3 \wedge 2 \rightarrow 5 \wedge (3 \wedge 2)]$$

- To produce the same result in the RUN Mode, the above calculation should be input: $(5^3)^2$

- Compound functions are executed from right to left.
- Anything contained within parentheses receives highest priority.

Example $2 + 3 \times (\log \sin 2\pi^2 + 6.8) = 22.07101691$ (angle unit = Rad)



■ Multiplication Operations without a Multiplication Sign

You can omit the multiplication sign (\times) in any of the following operations.

Example $2\sin 30$, $10\log 1.2$, $2\sqrt{3}$, $2\text{Pol}(5, 12)$, etc.

- Before constants, variable names, memory names

Example 2π , $2AB$, 3Ans , $3Y_1$, etc.

- Before an open parenthesis

Example $3(5 + 6)$, $(A + 1)(B - 1)$, etc.

Stacks

The unit employs memory blocks, called *stacks*, for storage of low priority values and commands. There is a 10-level *numeric value stack*, a 26-level *command stack*, and a 10-level *program subroutine stack*. An error occurs if you perform a calculation so complex that it exceeds the capacity of available numeric value stack or command stack space, or if execution of a program subroutine exceeds the capacity of the subroutine stack.

Example $2 \times ((3 + 4 \times (5 + 4) \div 3) \div 5) + 8 =$

Numeric Value Stack

①	2
②	3
③	4
④	5
⑤	4
⋮	

Command Stack

①	×
②	(
③	(
④	+
⑤	×
⑥	(
⑦	+
⋮	



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- Calculations are performed according to the priority sequence. Once a calculation is executed, it is cleared from the stack.
- Storing a complex number takes up two numeric value stack levels.
- Storing a two-byte function takes up two command stack levels.

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Input, Output and Operation Limitations

The allowable range for both input and output values is 10 digits for the mantissa and 2 digits for the exponent. Internally, however, the unit performs calculations using 15 digits for the mantissa and 2 digits for the exponent.

Example $3 \times 10^5 \div 7 - 42857 =$

AC 3 EXP 5 ÷ 7 EXE
 3 EXP 5 ÷ 7 =
 4 2 8 5 7 EXE

3e5/7	
	42857.14286
3e5/7-42857	
	0.1428571428

■ Overflow and Errors

Exceeding a specified input or calculation range, or attempting an illegal input causes an error message to appear on the display. Further operation of the calculator is impossible while an error message is displayed. The following events cause an error message to appear on the display.



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- When any result, whether intermediate or final, or any value in memory exceeds $\pm 9.99999999 \times 10^{99}$ (Ma ERROR).
- When an attempt is made to perform a function calculation that exceeds the input range (Ma ERROR).
- When an illegal operation is attempted during statistical calculations (Ma ERROR). For example, attempting to obtain 1VAR without data input.
- When the capacity of the numeric value stack or command stack is exceeded (Stk ERROR). For example, entering 25 successive $\boxed{\square}$ followed by 2 $\boxed{+}$ 3 $\boxed{\times}$ 4 \boxed{EXE} .
- When an attempt is made to perform a calculation using an illegal formula (Syn ERROR). For example, 5 $\boxed{\times}$ $\boxed{\times}$ 3 \boxed{EXE} .
- When you try to perform a calculation that causes memory capacity to be exceeded (Mem ERROR).
- When you use a command that requires an argument, without providing a valid argument (Arg ERROR).
- When an attempt is made to use an illegal dimension during matrix calculations (Dim ERROR).
- When no solution exists for an ALGBR Mode operation (Undefined).
- When the result of an ALGBR Mode operation exceeds the range of the calculator (Overflow ERROR).
- When a value input in the ALGBR Mode is outside the domain of the operation being performed (Domain ERROR).
- When an ALGBR Mode operation in which only real numbers have been input produces a result that is a complex number while the set up screen's Answer Type item is specified as "Real" (Non-Real ERROR).
- When no solution can be obtained using the Solve Function in the ALGBR Mode (No Solution).
- When an attempt is made to use **approx** with an expression that generates an error unique to the ALGBR Mode (Ma ERROR).

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- Other errors can occur during program execution. Most of the calculator's keys are inoperative while an error message is displayed. You can resume operation using one of the two following procedures.
 - Press the \boxed{AC} key to clear the error and return to normal operation.
 - Press $\boxed{\leftarrow}$ or $\boxed{\rightarrow}$ to display the error.

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■ Memory Capacity

Each time you press a key, either one byte or two bytes is used. Some of the functions that require one byte are: $\boxed{1}$, $\boxed{2}$, $\boxed{3}$, sin, cos, tan, log, ln, $\sqrt{\quad}$, and π . Some of the functions that take up two bytes are $d/dx()$, Mat, Xmin, If, For, Return, DrawGraph, SortA(), PxlOn, Sum, and Δ_{n+1} .

When the number of bytes remaining drops to five or below, the cursor automatically changes from “_” to “█”. If you still need to input more, you should divide your calculation into two or more parts.



- As you input numeric values or commands, they appear flush left on the display. Calculation results, on the other hand, are displayed flush right, except in the ALGBR Mode.

■ Graphic Display and Text Display

The unit uses both a graphic display and a text display. The graphic display is used for graphics, while the text display is used for calculations and instructions. The contents of each type of display are stored in independent memory areas.

●To switch between the graphic display and text display

Press $\boxed{\text{SHIFT}} \boxed{\text{F6}}$ (G \leftrightarrow T). You should also note that the key operations used to clear each type of display are different.

●To clear the graphic display

Press $\boxed{\text{SHIFT}} \boxed{\text{F4}}$ (Sketch) $\boxed{\text{F1}}$ (Cls) $\boxed{\text{EXE}}$.

●To clear the text display

Press $\boxed{\text{AC}}$.

■ Editing Calculations

Use the \leftarrow and \rightarrow keys to move the cursor to the position you want to change, and then perform one of the operations described below. After you edit the calculation, you can execute it by pressing $\boxed{\text{EXE}}$, or use \rightarrow to move to the end of the calculation and input more.

●To change a step

Example To change cos60 to sin60

$\boxed{\text{cos}} \boxed{6} \boxed{0}$

$\boxed{\text{cos } 60_}$

$\leftarrow \leftarrow \leftarrow$

$\boxed{_ \text{cos } 60}$

$\boxed{\text{sin}}$

$\boxed{\text{sin } 60}$

●To delete a step

Example To change $369 \times \times 2$ to 369×2

$\boxed{3} \boxed{6} \boxed{9} \boxed{\times} \boxed{\times} \boxed{2}$

$369 \times \times 2$

$\leftarrow \leftarrow \boxed{\text{DEL}}$

369×2

●To insert a step

Example To change 2.36^2 to $\sin 2.36^2$

$\boxed{2} \boxed{\cdot} \boxed{3} \boxed{6} \boxed{x^2}$

2.36^2

$\leftarrow \leftarrow \leftarrow \leftarrow \leftarrow$

2.36^2

$\boxed{\text{SHIFT}} \boxed{\text{INS}}$

2.36^2

$\boxed{\sin}$

$\sin 2.36^2$

- When you press $\boxed{\text{SHIFT}} \boxed{\text{INS}}$ the insert location is indicated by the symbol "□". The next function or value you input is inserted at the location of "□". To abort the insert operation without inputting anything, move the cursor, press $\boxed{\text{SHIFT}} \boxed{\text{INS}}$ again, or press \leftarrow , \rightarrow or $\boxed{\text{EXE}}$.

1-2 Memory

■ Variables

This calculator comes with 28 variables as standard. You can use variables to store values to be used inside of calculations. Variables are identified by single-letter names, which are made up of the 26 letters of the alphabet, plus r and θ . The maximum size of values that you can assign to variables is 15 digits for the mantissa and 2 digits for the exponent. Variable contents are retained even when you turn power off.

● To assign a value to a variable

[value] \rightarrow [variable name] EXE

Example To assign 123 to variable A

AC 1 2 3 \rightarrow ALPHA A EXE 123 \rightarrow A 123

Example To add 456 to variable A and store the result in variable B

AC ALPHA A $+$ 4 5 6 \rightarrow ALPHA B EXE A+456 \rightarrow B 579

● To display the contents of a variable

Example To display the contents of variable A

AC ALPHA A EXE A 123

● To clear a variable

Example To clear variable A

AC 0 \rightarrow ALPHA A EXE θ \rightarrow A 0

- To clear all variables, select “Memory Usage” from the **SYS** Mode.

● To assign the same value to more than one variable

[value] \rightarrow [first variable name] ALPHA F3 (\sim) [last variable name] EXE

- You cannot use “ r ” or “ θ ” as a variable name in the above operation.

Example To assign a value of 10 to variables A through F

AC 1 0 \rightarrow SHIFT ALPHA A
 F3 (\sim) F EXE 10 \rightarrow A \sim F 10



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■ Function Memory

[OPTN]-[FMEM]

Function memory is convenient for temporary storage of often-used expressions. For longer term storage, we recommend that you use the GRAPH Mode for expressions and the PRGM Mode for programs.

- {**STO**}/{**RCL**}/{**fn**}/{**SEE**} ... {function store}/{function recall}/{function area specification as a variable name inside an expression}/{function list}

●To store a function

Example To store the function $(A+B)(A-B)$ as function memory number 1

OPTN F6 (\triangleright) F6 (\triangleright) F3 (FMEM) AC	<code>(A+B)(A-B)_</code>
(ALPHA A + ALPHA B)	
(ALPHA A - ALPHA B)	
F1 (STO) F1 (f ₁)	<code>== Function Memory == f1:(A+B)(A-B)</code>

- If the function memory number you assign a function to already contains a function, the previous function is replaced with the new one.

●To recall a function

Example To recall the contents of function memory number 1

OPTN F6 (\triangleright) F6 (\triangleright) F3 (FMEM) AC	<code>(A+B)(A-B)_</code>
F2 (RCL) F1 (f ₁)	

- The recalled function appears at the current location of the cursor on the display.

●To display a list of available functions

OPTN F6 (\triangleright) F6 (\triangleright) F3 (FMEM)	<code>== Function Memory == f1:(A+B)(A-B) f2: f3: f4: f5: f6: STO RCL fn SEE</code>
F4 (SEE)	

●To delete a function

Example To delete the contents of function memory number 1

OPTN F6 (>) F6 (>) F3 (FMEM) AC
 F1 (STO) F1 (f₁)

```
== Function Memory ==
f1:
```

- Executing the store operation while the display is blank deletes the function in the function memory you specify.

●To use stored functions

Once you store a function in memory, you can recall it and use it for a calculation. This feature is very useful for quick and easy input of functions when programming or graphing.

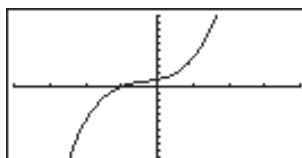
Example To store $x^3 + 1$, $x^2 + x$ into function memory, and then graph:
 $y = x^3 + x^2 + x + 1$

Use the following View Window parameters.

Xmin = -4 Ymin = -10
 Xmax = 4 Ymax = 10
 Xscale = 1 Yscale = 1

SHIFT SETUP (▼) F1 (Y=) EXIT OPTN F6 (>) F6 (>) F3 (FMEM)
 AC X,0,T ^ 3 + 1 F1 (STO) F1 (f₁) (stores $(x^3 + 1)$)
 AC X,0,T x² + X,0,T F1 (STO) F2 (f₂) (stores $(x^2 + x)$)

AC SHIFT F4 (Sketch) F1 (Cls) EXE
 SHIFT F4 (Sketch) F5 (GRPH) F1 (Y=)
 OPTN F6 (>) F6 (>) F3 (FMEM)
 F3 (f₁) F1 (f₁) + F2 (f₂) EXE



- For full details about graphing, see “8. Graphing”.

■ Memory Status

You can check how much memory is used for storage for each type of data. You can also see how many bytes of memory are still available for storage.

●To check the memory status

1. In the Main Menu, select the **SYS** icon and press **EXE**.

```
System
Color Contrast
Memory Usage
Reset

To Select:[↑][↓]
To Set :[EXE]
```

2. Press \blacktriangledown **EXE** to display the memory status screen.

Memory Usage	
Program	0
Statistics	0
Matrix	0
List File	0
Y=	0
Y= 28629 BytesFree	
DEL	

Number of bytes still free

3. Use \blacktriangle and \blacktriangledown to move the highlighting and view the amount of memory (in bytes) used for storage of each type of data.

The following table shows all of the data types that appear on the memory status screen.

Data Type	Meaning
Program	Program data
Statistics	Statistical calculations and graphs
Matrix	Matrix memory data
List File	List data
Y=	Graph functions
Draw Memory	Graph drawing conditions (View Window, enlargement/reduction factor, graph screen)
Graph Memory	Graph memory data
View Window	View Window memory data
Picture	Graph screen data
Dynamic Graph	Dynamic Graph data
Table	Function Table & Graph data
Recursion	Recursion Table & Graph data
Equation	Equation calculation data
Alpha Memory	Alpha memory data
Function Mem	Function memory data
Financial	Financial data

■ Clearing Memory Contents

Use the following procedure to clear data stored in memory.

1. In the memory status screen, use ▲ and ▼ to move the highlighting to the data type you want to clear.

If the data type you select in step 1 allows deletion of specific data

2. Press **F1** (DEL).



** This menu appears when you select List File.*

3. Press the function key that corresponds to the data you want to delete.



- The above example shows the function menu that appears when you highlight {List File} in step 1.

4. Press **F1** (YES).

If the data type you select in step 1 allows deletion of all data only

2. Press **F1** (DEL).



3. Press **F1** (YES) to delete all of the data.

1-3 Option (OPTN) Menu

The option menu gives you access to scientific functions and features that are not marked on the calculator's keyboard. The contents of the option menu differ according to the mode you are in when you press the **OPTN** key.

See the Command List at the back of this user's guide for details on the option (OPTN) menu.



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● Option Menu in the RUN and PRGM Modes

- {LIST} ... {list function menu}
- {MAT} ... {matrix operation menu}
- {CPLX} ... {complex number calculation menu}
- {CALC} ... {functional analysis menu}
- {STAT} ... {paired-variable statistical estimated value menu}
- {COLR} ... {graph color menu}
- {HYP} ... {hyperbolic calculation menu}
- {PROB} ... {probability/distribution calculation menu}
- {NUM} ... {numeric calculation menu}
- {ANGL} ... {menu for angle/coordinate conversion, sexagesimal input/conversion}
- {ESYM} ... {engineering symbol menu}
- {PICT} ... {graph save/recall menu}
- {FMEM} ... {function memory menu}
- {LOGIC} ... {logic operator menu}

Pressing **OPTN** causes the following function key menu to appear while binary, octal, decimal, or hexadecimal is set as the default number system.

- {COLR} ... {graph color menu}

● Option Menu during numeric data input in the STAT, MAT, LIST, TABLE, RECUR and EQUA Modes

- {LIST}/{HYP}/{PROB}/{NUM}/{ANGL}/{ESYM}/{FMEM}/{LOGIC}

● Option Menu during formula input in the GRAPH, DYNA, TABLE, RECUR and EQUA Modes

- {List}/{CALC}/{HYP}/{PROB}/{NUM}/{FMEM}/{LOGIC}

● Option Menu during expression input in the ALGBR Mode

- {Abs}/{HYP}/{i}/{x!}/{sign}/{FMEM}

The meanings of the option menu items are described in the sections that cover each mode.

1-4 Variable Data (VARS) Menu

To recall variable data, press $\boxed{\text{VARS}}$ to display the variable data menu.

$\{\text{V-WIN}\}/\{\text{FACT}\}/\{\text{STAT}\}/\{\text{GRPH}\}/\{\text{DYNA}\}/\{\text{TABL}\}/\{\text{RECR}\}/\{\text{EQUA}\}/\{\text{TVM}\}$

See the Command List at the back of this user's guide for details on the variable data (VARS) menu.

- Note that the EQUA and TVM items appear for function keys ($\boxed{\text{F3}}$ and $\boxed{\text{F4}}$) only when you access the variable data menu from the **RUN** or **PRGM** Mode.
- The variable data menu does not appear if you press $\boxed{\text{VARS}}$ while binary, octal, decimal, or hexadecimal is set as the default number system.



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■ V-WIN — Recalling View Window values

Selecting $\{\text{V-WIN}\}$ from the VARS menu displays the View Window value recall menu.

- $\{\text{X}\}/\{\text{Y}\}/\{\text{T},\theta\}$... $\{x\text{-axis menu}\}/\{y\text{-axis menu}\}/\{\text{T}, \theta \text{ menu}\}$
- $\{\text{R-X}\}/\{\text{R-Y}\}/\{\text{R-T},\theta\}$... $\{x\text{-axis menu}\}/\{y\text{-axis menu}\}/\{\text{T},\theta \text{ menu}\}$ for right side of Dual Graph

The following are the items that appear in the above menus.

- $\{\text{min}\}/\{\text{max}\}/\{\text{scal}\}/\{\text{ptch}\}$... $\{\text{minimum value}\}/\{\text{maximum value}\}/\{\text{scale}\}/\{\text{pitch}\}$



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■ FACT — Recalling enlargement/reduction factors

Selecting $\{\text{FACT}\}$ from the VARS menu displays the enlargement/reduction factor recall menu.

- $\{\text{Xfct}\}/\{\text{Yfct}\}$... $\{x\text{-axis factor}\}/\{y\text{-axis factor}\}$

■ STAT — Recalling Single/Paired-variable Statistical Data

Selecting $\{\text{STAT}\}$ from the VARS menu displays the single/paired-variable statistical data recall menu.

$\{\text{X}\}/\{\text{Y}\}/\{\text{GRPH}\}/\{\text{PTS}\}/\{\text{TEST}\}/\{\text{RESLT}\}$

- $\{\text{X}\}/\{\text{Y}\}$... $\{x\text{-data menu}\}/\{y\text{-data menu}\}$

The following are the items that appear in the above menus.

- $\{n\}$... $\{\text{number of data}\}$
- $\{\bar{x}\}/\{\bar{y}\}$... $\{\text{mean of } x\text{-data}\}/\{y\text{-data}\}$
- $\{\Sigma x\}/\{\Sigma y\}$... $\{\text{sum of } x\text{-data}\}/\{y\text{-data}\}$
- $\{\Sigma x^2\}/\{\Sigma y^2\}$... $\{\text{sum of squares of } x\text{-data}\}/\{y\text{-data}\}$
- $\{\Sigma xy\}$... $\{\text{sum of products of } x\text{-data and } y\text{-data}\}$



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- $\{x\sigma_n\}/\{y\sigma_n\}$... population standard deviation of {x-data}/{y-data}
- $\{x\sigma_{n-1}\}/\{y\sigma_{n-1}\}$... sample standard deviation of {x-data}/{y-data}
- $\{\min X\}/\{\min Y\}$... minimum value of {x-data}/{y-data}
- $\{\max X\}/\{\max Y\}$... maximum value of {x-data}/{y-data}

● **{GRPH}** ...{graph data menu}

The following are the items that appear in the above menu.

- $\{a\}/\{b\}/\{c\}/\{d\}/\{e\}$... {regression coefficient and multinomial coefficients}
- $\{r\}$... {correlation coefficient}
- $\{Q1\}/\{Q3\}$... {first quartile}/{third quartile}
- $\{\text{Med}\}/\{\text{Mod}\}$... {median}/{mode} of input data
- $\{\text{Strt}\}/\{\text{Pitch}\}$... histogram {start division}/{pitch}
- $\{\text{Iter}\}/\{\text{Perid}\}$... sine regression {number of iterations}/{period}

● **{PTS}** ... {summary point data menu}

The following are the items that appear in the above menu.

- $\{x1\}/\{y1\}/\{x2\}/\{y2\}/\{x3\}/\{y3\}$... {coordinates of summary points}

● **{TEST}** ... {test data recall}

The following are the items that appear in the above menu.

- $\{n\}/\{\bar{x}\}/\{x\sigma_{n-1}\}$... {number of data}/{data mean}/{sample standard deviation}
- $\{n_1\}/\{n_2\}$... number of {data 1}/{data 2}
- $\{\bar{x}_1\}/\{\bar{x}_2\}$... mean of {data 1}/{data 2}
- $\{x_1\sigma\}/\{x_2\sigma\}$... sample standard deviation of {data 1}/{data 2}
- $\{x_p\sigma\}$... {pooled sample standard deviation}
- $\{F\}$... {F value}
- $\{Fdf\}/\{SS\}/\{MS\}$... factor {degrees of freedom}/{sum of squares}/{mean of squares}
- $\{Edf\}/\{SSE\}/\{MSe\}$... error {degrees of freedom}/{sum of squares}/{mean of squares}

● **{RESULT}** ... {test result recall}

The following are the items that appear in the above menu.

- $\{p\}$... {p value}
- $\{z\}/\{t\}/\{\text{Chi}\}/\{F\}$... {Z test results}/{t test results}/{ χ^2 test results}/{F test results}
- $\{\text{Left}\}/\{\text{Right}\}$... {interval lower limit (left edge)}/{interval upper limit (right edge)}
- $\{\hat{p}\}/\{\hat{p}_1\}/\{\hat{p}_2\}$... {expected probability value}/{expected probability value 1}/{expected probability value 2}
- $\{df\}/\{s\}/\{r\}/\{r^2\}$... {degrees of freedom}/{standard error}/{correlation coefficient}/{coefficient of determination}



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■ GRPH — Recalling Graph Functions

Selecting {GRPH} from the VARS menu displays the graph function recall menu.

- {Y}/{r} ... {rectangular coordinate or inequality function}/{polar coordinate function}
- {Xt}/{Yt} ... parametric graph function {Xt}/{Yt}
- {X} ... {X=constant graph function}

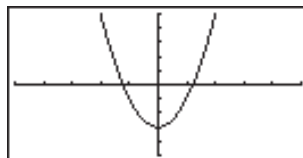
(Press these keys before inputting a value to specify a storage area.)

Example To recall and draw the graph for the rectangular coordinate function $y = 2x^2 - 3$, which is stored in storage area Y2

Use the following View Window parameters to draw the graph.

Xmin = -5 Ymin = -5
 Xmax = 5 Ymax = 5
 Xscale = 1 Yscale = 1

SHIFT F4 (Sketch) FB (GRPH) F1 (Y=)
 VARS F4 (GRPH) F1 (Y) 2 EXE



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■ DYNA — Recalling Dynamic Graph Set Up Data

Selecting {DYNA} from the VARS menu displays the Dynamic Graph set up data recall menu.

- {Strt}/{End}/{Pitch} ... {coefficient range start value}/{coefficient range end value}/{coefficient value increment}

■ TABL — Recalling Table & Graph Set Up and Content Data

Selecting {TABL} from the VARS menu displays the Table & Graph set up and content data recall menu.

- {Strt}/{End}/{Pitch} ... {table range start value}/{table range end value}/{table value increment}
- {Reslt} ... {matrix of table contents}
- The Reslt item appears for function key F4 only when the above menu is displayed in the RUN or PRGM Mode.



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Example To recall the contents of the numeric table for the function $y = 3x^2 - 2$, while the table range is Start=0 and End=6, and pitch=1

F4 (Reslt) **EXE**

Ans	1	2
1	0	-2
2	1	1
3	2	10
4	3	25
5	4	46

RECR — Recalling Recursion Formula, Table Range, and Table Content Data

Selecting {RECR} from the VARS menu displays the recursion data recall menu.

- **{FORM}** ... {recursion formula data menu}

The following are the items that appear in the above menu.

- $\{a_n\}/\{a_{n+1}\}/\{a_{n+2}\}/\{b_n\}/\{b_{n+1}\}/\{b_{n+2}\}$... $\{a_n\}/\{a_{n+1}\}/\{a_{n+2}\}/\{b_n\}/\{b_{n+1}\}/\{b_{n+2}\}$ expressions

- **{RANG}** ... {table range data menu}

The following are the items that appear in the above menu.

- **{Strt}/{End}** ... {table range start value}/ {table range end value}
- $\{a_0\}/\{a_1\}/\{a_2\}$... {zero term a_0 value}/ {first term a_1 value}/ {second term a_2 value}
- $\{b_0\}/\{b_1\}/\{b_2\}$... {zero term b_0 value}/ {first term b_1 value}/ {second term b_2 value}
- $\{a_n\text{St}\}/\{b_n\text{St}\}$... origin of $\{a_n\}/\{b_n\}$ recursion formula convergence/divergence graph (WEB graph)

- **{Reslt}** ... {matrix of table contents}

Selecting {Reslt} displays a matrix that shows the contents of the recursion table.

- This operation is available only in the **RUN** and **PRGM** modes.

Example To recall the contents of the numeric table for recursion formula $a_n = 2n + 1$, while the table range is Start=1 and End=6

F3 (Reslt) **EXE**

Ans	1	2
1	3	3
2	5	5
3	7	7
4	9	9
5	11	11



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- The table contents recalled by the above operation are stored automatically in Matrix Answer Memory (MatAns).
- An error occurs if you perform the above operation when there is no function or recursion formula numeric table in memory.

■ EQUA — Recalling Equation Coefficients and Solutions

Selecting {EQUA} from the VARS menu displays the equation coefficient and solution recall menu.

- {S-Rlt}/{S-Cof} ... matrix of {solutions}/{coefficients} for linear equations with two through six unknowns
- {P-Rlt}/{P-Cof} ... matrix of {solution}/{coefficients} for a quadratic or cubic equation

Example 1 To recall the solutions for the following linear equations with two unknowns

$$2x + 3y = 8$$

$$3x + 5y = 14$$

[F1] (S-Rlt) [EXE]

Ans	1
1	-2
2	4

Example 2 To recall the coefficients for the following linear equations with three unknowns

$$4x + y - 2z = -1$$

$$x + 6y + 3z = 1$$

$$-5x + 4y + z = -7$$

[F2] (S-Cof) [EXE]

Ans	1	2	3	4
1	4	1	-2	-1
2	1	6	3	1
3	-5	4	1	-7

Example 3 To recall the solutions for the following quadratic equation

$$2x^2 + x - 10 = 0$$

[F3] (P-Rlt) [EXE]

Ans	1
1	-2.5
2	-2.5

Example 4 To recall the coefficients for the following quadratic equation

$$2x^2 + x - 10 = 0$$

[F4] (P-Cof) [EXE]

Ans	1	2	3
1	2	1	-10

- The coefficients and solutions recalled by the above operation are stored automatically in Matrix Answer Memory (MatAns).
- When the solutions for a linear equation with 2 through 6 unknowns contain complex numbers, only the real number parts are stored in Matrix Answer Memory (MatAns).
- Coefficient and solution memory data for a linear equation with 2 through 6 unknowns cannot be recalled at the same time.
- The following conditions cause an error to be generated.
 - When there are no coefficients input for the equation
 - When there are no solutions obtained for the equation

■ TVM — Recalling Financial Calculation Data

Selecting {TVM} from the VARS menu displays the financial calculation data recall menu.

- $\{n\}/\{I\% \}/\{PV\}/\{PMT\}/\{FV\}$... {payment periods (installments)}/{interest (%)}/
 {present value}/{payment amount}/{future value}
- $\{P/Y\}/\{C/Y\}$... {number of installment periods per year}/{number of
 compounding periods per year}

1-5 Program (PRGM) Menu

To display the program (PRGM) menu, first enter the **RUN** or **PRGM** Mode from the Main Menu and then press **SHIFT** **PRGM**. The following are the selections available in the program (PRGM) menu.

- **{COM}** ... {program command menu}
- **{CTL}** ... {program control command menu}
- **{JUMP}** ... {jump command menu}
- **{?}** ... {input command}
- **{▲}** ... {output command}
- **{CLR}** ... {clear command menu}
- **{DISP}** ... {display command menu}
- **{REL}** ... {conditional jump relational operator menu}
- **{I/O}** ... {input/output control command menu}
- **{:}** ... {multistatement connector}

The function key menu appears if you press **SHIFT** **PRGM** in the RUN Mode or the PRGM Mode while binary, octal, decimal, or hexadecimal is set as the default number system.

- **{Prog}/**{JUMP}/**{?}/**{▲}/**{REL}/**{:}

The functions assigned to the function keys are the same as those in the Comp Mode.



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For details on the commands that are available in the various menus you can access from the program menu, see “21. Programming”.