

Input an initial value for X (Here, input 1):  $\boxed{1}$

$$\begin{array}{l} Y=X^2-X+1 \\ X= \\ L-R= \end{array} \quad \begin{array}{l} \text{Math} \\ 2 \\ 0 \end{array}$$

$\boxed{7}$

$$\begin{array}{l} Y=X^2-X+1 \\ X= \\ L-R= \end{array} \quad \begin{array}{l} \text{Math} \\ 3 \\ 0 \end{array}$$

$\boxed{13}$

$$\begin{array}{l} Y=X^2-X+1 \\ X= \\ L-R= \end{array} \quad \begin{array}{l} \text{Math} \\ 4 \\ 0 \end{array}$$

## Statistical Calculations (STAT)

To start a statistical calculation, perform the key operation  $\boxed{\text{MODE}} \boxed{3}$  (STAT) to enter the STAT Mode and then use the screen that appears to select the type of calculation you want to perform.

To select this type of statistical calculation:

(Regression formula shown in parentheses)

Press this key:

Single-variable (X)	$\boxed{1}$ (1-VAR)
Paired-variable (X, Y), linear regression ( $y = A + Bx$ )	$\boxed{2}$ (A+BX)
Paired-variable (X, Y), quadratic regression ( $y = A + Bx + Cx^2$ )	$\boxed{3}$ (L+CX <sup>2</sup> )
Paired-variable (X, Y), logarithmic regression ( $y = A + B \ln x$ )	$\boxed{4}$ (ln X)
Paired-variable (X, Y), $e$ exponential regression ( $y = Ae^{Bx}$ )	$\boxed{5}$ (e <sup>A</sup> X)
Paired-variable (X, Y), $ab$ exponential regression ( $y = AB^x$ )	$\boxed{6}$ (A•B <sup>x</sup> X)
Paired-variable (X, Y), power regression ( $y = Ax^B$ )	$\boxed{7}$ (A•X <sup>B</sup> )
Paired-variable (X, Y), inverse regression ( $y = A + B/x$ )	$\boxed{8}$ (1/X)

Pressing any of the above keys ( $\boxed{1}$  to  $\boxed{8}$ ) displays the Stat Editor.

**Note:** When you want to change the calculation type after entering the STAT Mode, perform the key operation  $\boxed{\text{SHIFT}} \boxed{1}$  (STAT/DIST)  $\boxed{1}$  (Type) to display the calculation type selection screen.

### Inputting Data

Use the Stat Editor to input data. Perform the following key operation to display the Stat Editor:  $\boxed{\text{SHIFT}} \boxed{1}$  (STAT/DIST)  $\boxed{2}$  (Data).

The Stat Editor provides 40 rows for data input when there is an X column only or when there are X and Y columns, 20 rows when there are X and FREQ columns, or 26 rows when there are X, Y, and FREQ columns.

**Note:** Use the FREQ (frequency) column to input the quantity (frequency) of identical data items. Display of the FREQ column can be turned on (displayed) or off (not displayed) using the Stat Format setting on the setup menu.



To select linear regression and input the following data:  
(170, 66), (173, 68), (179, 75)

$\boxed{\text{MODE}} \boxed{3}$  (STAT)  $\boxed{2}$  (A+BX)

$$\begin{array}{l} \text{STAT} \\ X \\ Y \end{array} \quad \begin{array}{l} \text{Math} \\ 2 \\ 0 \end{array}$$

170  $\boxed{=}$  173  $\boxed{=}$  179  $\boxed{=}$   $\boxed{\text{DOWN}}$   $\boxed{\text{RIGHT}}$

$$\begin{array}{l} \text{STAT} \\ X \\ Y \end{array} \quad \begin{array}{l} \text{Math} \\ 2 \\ 0 \end{array}$$

66  $\boxed{=}$  68  $\boxed{=}$  75  $\boxed{=}$

$$\begin{array}{l} \text{STAT} \\ X \\ Y \end{array} \quad \begin{array}{l} \text{Math} \\ 2 \\ 0 \end{array}$$

**Important:** • All data currently input in the Stat Editor is deleted whenever you exit the STAT Mode, switch between the single-variable and a paired-variable statistical calculation type, or change the Stat Format setting on the setup menu. • The following operations are not supported by the Stat Editor:  $\boxed{\text{MATH}} \boxed{\text{SHIFT}} \boxed{\text{MATH}} \boxed{\text{MATH}}$  (M-),  $\boxed{\text{SHIFT}} \boxed{\text{MODE}} \boxed{\text{STAT}}$  (O), Pol, Rec, +R, and multi-statements also cannot be input with the Stat Editor.

**To change the data in a cell:** In the Stat Editor, move the cursor to the cell that contains the data you want to change, input the new data, and then press  $\boxed{=}$ .

**To delete a line:** In the Stat Editor, move the cursor to the line that you want to delete and then press  $\boxed{\text{DEL}}$ .

**To insert a line:** In the Stat Editor, move the cursor to the location where you want to insert the line and then perform the following key operation:  $\boxed{\text{SHIFT}} \boxed{1}$  (STAT/DIST)  $\boxed{3}$  (Edit)  $\boxed{1}$  (Ins).

**To delete all Stat Editor contents:** In the Stat Editor, perform the following key operation:  $\boxed{\text{SHIFT}} \boxed{1}$  (STAT/DIST)  $\boxed{3}$  (Edit)  $\boxed{2}$  (Del-A).

### Obtaining Statistical Values from Input Data

To obtain statistical values, press  $\boxed{\text{F6}}$  while in the Stat Editor and then recall the statistical variable ( $\alpha_x$ ,  $\Sigma x^2$ , etc.) you want. Supported statistical variables and the keys you should press to recall them are shown below. For single-variable statistical calculations, the variables marked with an asterisk (\*) are available.

**Sum:**  $\Sigma x^2$ ,  $\Sigma x^*$ ,  $\Sigma y^2$ ,  $\Sigma y$ ,  $\Sigma xy$ ,  $\Sigma x^3$ ,  $\Sigma x^2y$ ,  $\Sigma x^4$

$\boxed{\text{SHIFT}} \boxed{1}$  (STAT/DIST)  $\boxed{3}$  (Sum)  $\boxed{1}$  to  $\boxed{8}$

**Number of Items:**  $n^*$ , **Mean:**  $\bar{x}^*$ ,  $\bar{y}$ , **Population Standard Deviation:**  $\sigma^*$ ,

$\sigma_y$ , **Sample Standard Deviation:**  $s_x^*$ ,  $s_y$

$\boxed{\text{SHIFT}} \boxed{1}$  (STAT/DIST)  $\boxed{4}$  (Var)  $\boxed{1}$  to  $\boxed{7}$

**Regression Coefficients:** A, B, **Correlation Coefficient:**  $r$ , **Estimated Values:**  $\hat{x}$ ,  $\hat{y}$

$\boxed{\text{SHIFT}} \boxed{1}$  (STAT/DIST)  $\boxed{5}$  (Reg)  $\boxed{1}$  to  $\boxed{5}$

**Regression Coefficients for Quadratic Regression:** A, B, C, **Estimated Values:**  $\hat{x}_1$ ,  $\hat{x}_2$ ,  $\hat{y}$

$\boxed{\text{SHIFT}} \boxed{1}$  (STAT/DIST)  $\boxed{5}$  (Reg)  $\boxed{1}$  to  $\boxed{6}$

• See the table at the beginning of this section of the manual for the regression formulas.

- $\hat{x}$ ,  $\hat{y}$ ,  $\hat{x}_2$  and  $\hat{y}$  are not variables. They are commands of the type that take an argument immediately before them. See "Calculating Estimated Values" for more information.

**Minimum Value:** minX\*, minY, **Maximum Value:** maxX\*, maxY

**SHIFT** **1** (STAT/DIST) **6** (MinMax) **1** to **2**

(When the single-variable statistical calculation is selected.)

**SHIFT** **1** (STAT/DIST) **6** (MinMax) **1** to **4**

(When a paired-variable statistical calculation is selected.)

**First Quartile:** Q1, **Median:** med, **Third Quartile:** Q3

**SHIFT** **1** (STAT/DIST) **6** (MinMax) **3** to **5**

(When the single-variable statistical calculation is selected.)

**Note:** While single-variable statistical calculation is selected, you can input the functions and commands for performing normal distribution calculation from the menu that appears when you perform the following key operation:  
**SHIFT** **1** (STAT/DIST) **5** (Distr). See "Performing Normal Distribution Calculations" for details.

- 2** To input the single-variable data  $x = \{1, 2, 2, 3, 3, 3, 4, 4, 5\}$ , using the FREQ column to specify the number of repeats for each item ( $\{x_n; \text{freq}_n = \{1; 1, 2; 2, 3; 3, 4; 2, 5; 1\}$ ), and calculate the mean and population standard deviation.

**SHIFT** **MODE** (SETUP) **4** (STAT) **1** (ON)

**MODE** **3** (STAT) **1** (1-VAR)

**1** **2** **3** **4** **5** **6** **7** **8** **9** **0** **DEL** **ENTER**

**1** **2** **3** **4** **5** **6** **7** **8** **9** **0** **DEL** **ENTER**

**AC** **SHIFT** **1** (STAT/DIST) **4** (Var) **2** (s) **ENTER**



**3**  
**1.154700538**

**Results:** Mean: 3 Population Standard Deviation: 1.154700538

- 3** To calculate the linear regression and logarithmic regression correlation coefficients for the following paired-variable data and determine the regression formula for the strongest correlation:  $(x, y) = (20, 3150), (110, 7310), (200, 8800), (290, 9310)$ . Specify Fix 3 (three decimal places) for results.

**SHIFT** **MODE** (SETUP) **4** (STAT) **2** (OFF)

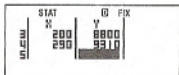
**SHIFT** **MODE** (SETUP) **6** (Fix) **3**

**MODE** **3** (STAT) **2** (A+BX)

**20** **ENTER** **110** **ENTER** **200** **ENTER** **290** **ENTER** **DEL** **ENTER**

**3150** **ENTER** **7310** **ENTER** **8800** **ENTER** **9310** **ENTER**

**AC** **SHIFT** **1** (STAT/DIST) **5** (Reg) **3** (r) **ENTER**



**0.923**

**AC** **SHIFT** **1** (STAT/DIST) **1** (Type) **4** (ln X)

**AC** **SHIFT** **1** (STAT/DIST) **5** (Reg) **3** (r) **ENTER**

**0.998**

**AC** **SHIFT** **1** (STAT/DIST) **5** (Reg) **1** (A) **ENTER**

**-3857.984**

**AC** **SHIFT** **1** (STAT/DIST) **5** (Reg) **2** (B) **ENTER**

**2357.532**

**Results:** Linear Regression Correlation Coefficient: 0.923

Logarithmic Regression Correlation Coefficient: 0.998

Logarithmic Regression Formula:  $y = -3857.984 + 2357.532 \ln x$

## Calculating Estimated Values

Based on the regression formula obtained by paired-variable statistical calculation, the estimated value of  $y$  can be calculated for a given  $x$ -value. The corresponding  $x$ -value (two values,  $x_1$  and  $x_2$ , in the case of quadratic regression) also can be calculated for a value of  $y$  in the regression formula.

- 4** To determine the estimate value for  $y$  when  $x = 160$  in the regression formula produced by logarithmic regression of the data in **3**. Specify Fix 3 for the result. (Perform the following operation after completing the operations in **3**.)

**AC** **160** **SHIFT** **1** (STAT/DIST) **5** (Reg) **3** (Y) **ENTER**

**8106.898**

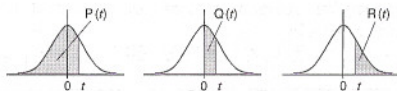
**Result:** 8106.898

**Important:** Regression coefficient, correlation coefficient, and estimated value calculations can take considerable time when there are a large number of data items.

## Performing Normal Distribution Calculations

While single-variable statistical calculation is selected, you can perform normal distribution calculation using the functions shown below from the menu that appears when you perform the following key operation:  
**SHIFT** **1** (STAT/DIST) **5** (Distr).

**P, Q, R:** These functions take the argument  $t$  and determine a probability of standard normal distribution as illustrated below.



**P:** This function is preceded by the argument X, and determines the normalized variate  $X \rightarrow t = \frac{X - \bar{x}}{\sigma_x}$ .

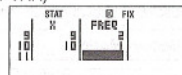
- 5** For the single variable data  $\{x_n; \text{freq}_n = \{0; 1, 1; 2, 2; 1, 3; 2, 4; 2, 5; 6; 3, 7; 4, 9; 2, 10; 1\}$ , to determine the normalized variate ( $\rightarrow t$ ) when  $x = 3$ , and  $P(t)$  at that point up to three decimal places (Fix 3).

**SHIFT** **MODE** (SETUP) **4** (STAT) **1** (ON)

**SHIFT** **MODE** (SETUP) **6** (Fix) **3** **MODE** **3** (STAT) **1** (1-VAR)

**0** **ENTER** **1** **ENTER** **2** **ENTER** **3** **ENTER** **4** **ENTER** **5** **ENTER** **6** **ENTER** **7** **ENTER** **8** **ENTER** **9** **ENTER**

**10** **ENTER** **DEL** **ENTER** **1** **ENTER** **2** **ENTER** **1** **ENTER** **3** **ENTER** **2** **ENTER** **4** **ENTER** **2** **ENTER** **5** **ENTER** **6** **ENTER** **3** **ENTER** **7** **ENTER** **4** **ENTER** **9** **ENTER** **2** **ENTER** **10** **ENTER** **1** **ENTER**



**4** **2** **ENTER** **1** **ENTER**

AC 3 (SHIFT) 1 (STAT/DIST) 5 (Distr) 4 (▶) (=)

STAT	ID	FIX
3	▶	
-0.762		

(SHIFT) 1 (STAT/DIST) 5 (Distr) 1 (P) (Inv) 1 (=)

STAT	ID	FIX
P	(Ans)	
0.223		

**Results:** Normalized variate (▶): -0.762  
P(): 0.223

## Base-*n* Calculations (BASE-N)

Press **MODE** 4 (BASE-N) to enter the BASE-N Mode when you want to perform calculations using decimal, hexadecimal, binary, and/or octal values. The initial default number mode when you enter the BASE-N Mode is decimal, which means input and calculation results use the decimal number format. Press one of the following keys to switch number modes: **2** (DEC) for decimal, **3** (HEX) for hexadecimal, **2** (BIN) for binary, or **1** (OCT) for octal.

To enter the BASE-N Mode, switch to the binary mode, and calculate  $11_2 + 1_2$

<b>MODE</b> 4 (BASE-N)	Dec
	0
<b>2</b> (BIN)	Bin
	0000000000000000
11 + 1 =	Bin
	0000000000000100

Continuing from above, switch to the hexadecimal mode and calculate  $1F_{16} + 1_{16}$

<b>AC</b> <b>3</b> (HEX) 1 (Inv) (F) + 1 (=)	Hex
	00000020

Continuing from above, switch to the octal mode and calculate  $7_8 + 1_8$

<b>AC</b> <b>1</b> (OCT) 7 + 1 (=)	Oct
	0000000010

**Note:** • Use the following keys to input the letters A through F for hexadecimal values: **2** (A), **3** (B), **4** (C), **5** (D), **6** (E), **7** (F). • In the BASE-N Mode, input of fractional (decimal) values and exponents is not supported. If a calculation result has a fractional part, it is cut off. • The input and output ranges is 16 bits for binary values, and 32 bits for other types of values. The following shows details about input and output ranges.

Base- <i>n</i> Mode	Input/Output Ranges
Binary	Positive: $0000000000000000 \leq x \leq 0111111111111111$ Negative: $1000000000000000 \leq x \leq 1111111111111111$

Octal	Positive: $0000000000 \leq x \leq 1777777777$ Negative: $2000000000 \leq x \leq 3777777777$
Decimal	$-2147483648 \leq x \leq 2147483647$
Hexadecimal	Positive: $00000000 \leq x \leq 7FFFFFFF$ Negative: $80000000 \leq x \leq FFFFFFFF$

## Specifying the Number Mode of a Particular Input Value

You can input a special command immediately following a value to specify the number mode of that value. The special commands are: d (decimal), h (hexadecimal), b (binary), and o (octal).

To calculate  $10_{10} + 10_{16} + 10_2 + 10_8$  and display the result as a decimal value

**AC** **2** (DEC) (SHIFT) **3** (BASE) (▼) **1** (d) 10 +  
(SHIFT) **3** (BASE) (▼) **2** (h) 10 +  
(SHIFT) **3** (BASE) (▼) **3** (b) 10 +  
(SHIFT) **3** (BASE) (▼) **4** (o) 10 =

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## Converting a Calculation Result to another Type of Value

You can use any one of the following key operations to convert the currently displayed calculation result to another type of value: **2** (DEC) (decimal), **3** (HEX) (hexadecimal), **2** (BIN) (binary), **1** (OCT) (octal).

To calculate  $15_{10} \times 37_{10}$  in the decimal mode, and then convert the result to hexadecimal, binary, and octal

**AC** **2** (DEC) 15 **X** 37 = **555**  
**3** (HEX) **000022B**  
**2** (BIN) **000001000101011**  
**1** (OCT) **0000001053**

## Logical and Negation Operations

Your calculator provides you with logical operators (and, or, xor, xnor) and functions (Not, Neg) for logical and negation operations on binary values. Use the menu that appears when you press **(SHIFT) 3** (BASE) to input these logical operators and functions.

All of the following examples are performed in the binary mode (**2** (BIN)).

To determine the logical AND of  $1010_2$  and  $1100_2$  ( $1010_2$  and  $1100_2$ )  
**AC** 1010 (SHIFT) **3** (BASE) **1** (and) 1100 = **00000000001000**

To determine the logical OR of  $1011_2$  and  $1101_2$  ( $1011_2$  or  $1101_2$ )  
**AC** 1011 (SHIFT) **3** (BASE) **2** (or) 1101 = **000000000011011**