# User's Guide

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# 1. Important Information

- The displays and illustrations (such as key markings) shown in this User's Guide are for illustrative purposes only, and may differ somewhat from the actual items they represent.
- The contents of this manual are subject to change without notice.
- In no event shall CASIO Computer Co., Ltd. be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the purchase or use of this product and items that come with it. Moreover, CASIO Computer Co., Ltd. shall not be liable for any claim of any kind whatsoever by any other party arising out of the use of this product and the items that come
- Be sure to keep all user documentation handy for future reference.

### 2. Sample Operations

Sample operations in this manual are indicated by a // icon. Unless specifically stated, all sample operations assume that the calculator is in its initial default setup. Use the procedure under "3, Initializing the Calculator" to return the calculator to its initial default setup

# 3. Initializing the Calculator

Perform the following procedure when you want to initialize the calculator and return the calculation mode and setup to their initial default settings. Note that this operation also clears all data currently

fx-82MS/85MS/300MS/350MS: (ON SHIFT MODE (CLR) (3 (AII) ( fx-82SX PLUS/220 PLUS: ON CR 3 (All) =

# 4. Safety Precautions



- Keep batteries out of the reach of small children.
- Use only the type of battery specified for this calculator in this manual.

### 5. Handling Precautions

- Dim figures on the display of the calculator indicate that battery power is low. Continued use of the calculator when the battery is low can result in improper operation. Replace the battery as soon as possible when display figures becomes dim. Even if the calculator is operating normally, replace the battery at least once every two years (fx-82MS/82SX PLUS/220 PLUS), or three years (fx-85MS/300MS/350MS). A dead battery can leak causing damage to and malfunction of the calculator. Never leave a dead battery in the calculator.
- · The battery that comes with the calculator discharges slightly during shipment and storage. Because of this, it may require replacement sooner than the normal expected battery life.
- · Do not use an oxyride battery\* or any other type of nickel-based primary battery with this product. Incompatibility between such batteries and product specifications can result in shorter battery life and product malfunction.
- Avoid use and storage of the calculator in areas subjected to temperature extremes, and large amounts of humidity and
- · Do not subject the calculator to excessive impact, pressure or bending

- Never try to take the calculator apart.
- Use a soft, dry cloth to clean the exterior of the calculator
- · Whenever discarding the calculator or batteries, be sure to do so in accordance with the laws and regulations in your particular area.
- Company and product names used in this manual may be registered trademarks or trademarks of their respective owners

### 6. Removing the Hard Case

Before using the calculator, slide its hard case downwards to remove it, and then affix the hard case to the back of the calculator as shown in the illustration nearby





# 7. Turning Power On and Off

Press (IN) to turn on the calculator Press SHFT ACI (OFF) to turn off the calculator

#### Auto Power Off

Your calculator will turn off automatically if you do not perform any operation for about 10 minutes

# 8. Adjusting Display Contrast

1. Press the MODE key a number of times until you reach the setup screen shown to the riaht.



2. Press 2

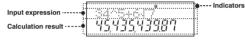
3. Use (4) and (5) to adjust contrast.

4. After the setting is the way you want, press AC.

Important: If adjusting display contrast does not improve display readability, it probably means that battery power is low. Replace the battery

# 9. Reading the Display

The display of the calculator shows expressions you input, calculation results, and various indicators



### 10. Specifying the Calculation Mode

When you want to perform this type of operation:	Perform this key operation:
General calculations	MODE 1 (COMP)
Standard deviation	MODE 2 (SD)
Regression calculations (fx-82MS/85MS/ 300MS/350MS only)	MODE 3 (REG)

Note: • The initial default calculation mode is the COMP Mode • Mode indicators appear in the upper part of the display. Be sure to check the current calculation mode (COMP, SD, REG) and angle unit setting (Deg. Rad. Gra) before beginning a calculation

# 11. Configuring the Calculator Setup

Pressing the MODE key more than once displays additional setup screens. Underlined (\_\_\_\_) settings are initial defaults.

1 Deg 2 Rad 3 Gra Specifies degrees, radians or grads as the angle unit for value input and calculation result display

Deg Rad Gra 1 2 3

Note: In this manual, the Deg symbol next to a sample operation indicates degrees

1 Fix 2 Sci 3 Norm Specifies the number of digits for display of a calculation

Fix: The value you specify (from 0 to 9) controls the number of decimal places for displayed calculation results. Calculation results are rounded off to the specified digit before being displayed. Example:  $100 \div 7 = 14.286$  (Fix 3)

Sci: The value you specify (from 1 to 10) controls the number of significant digits for displayed calculation results. Calculation results are rounded off to the specified digit before being displayed. Example:  $1 \div 7 = 1.4286 \times 10^{-1}$  (Sci 5)

Norm: Selecting one of the two available settings (Norm 1, Norm 2) determines the range in which results will be displayed in nonexponential format. Outside the specified range, results are displayed using exponential format.

Norm 1:  $10^{-2} > |x|, |x| \ge 10^{10}$  Norm 2:  $10^{-9} > |x|, |x| \ge 10^{10}$ Example:  $1 \div 200 = 5 \times 10^{-3}$  (Norm 1); 0.005 (Norm 2)

Disp **∢**CONT▶ ① ab/c d/c Dot Comma 1 ab/c 2 d/c Specifies either mixed fraction (ab/c) or improper raction (d/c) for display of fractions in calculation results

1 Dot 2 Comma Specifies whether to display a dot or a comma for the calculation result decimal point. A dot is always displayed during input.

# ■ Initializing Calculator Settings

Perform the following procedure to initialize the calculator, which returns the calculation mode to COMP and returns all other settings, including setup menu settings, to their initial defaults.

fx-82MS/85MS/300MS/350MS: [ON] [SHFT] [MODE] (CLR) [2] (Mode) [=] fx-82SX PLUS/220 PLUS: ON CR 2 (Mode)

### 12. Inputting Expressions and Values

4×sin30×(30 120.

 $4 \times \sin 30 \times (30 + 10 \times 3) = 120$  Deg 4 X sin 30 X ( 30 + 10 X 3 ) = Note: • The memory area used for calculation input can hold 79

"steps". One step is taken up each time you press a number key or arithmetic operator key (+, -, X, +). A SHIT or WHW (fx-82MS/85MS/300MS/350MS only) key operation does not take up a step, so inputting  $[x](3\sqrt{\ })$ , for example, takes up only one step. Whenever you input the 73rd step of any calculation, the cursor changes from " " to "\boxed" to let you know memory is running low.

#### ■ Calculation Priority Sequence

When the priority of two expressions is the same, the calculation is performed from left to right.

1st	Function with parentheses: $Pol(x, y)$ , $Rec(r, \theta)$ , $RanInt\#(a, b)^*$ (*fx-82SX PLUS/220 PLUS only)
2nd	Type A functions: With these functions, the value is entered and then the function key is pressed. $(x^3, x^2, x^{-1}, x!, \circ `", \hat{x}, \hat{x}, \hat{x}_2, \hat{y}, \circ, r, s)$
3rd	Powers and roots: ^(x), x√
4th	Fractions
5th	Implied multiplication of $\pi$ , $e$ (natural logarithm base), memory name, or variable name: $2\pi$ , $3e$ , $5A$ , $\pi A$ , etc.
6th	Type B functions: With these functions, the function key is pressed and then the value is entered. ( $\sqrt{}$ , $\sqrt{}$ , $\log$ , $\ln$ , $e^x$ , $10^x$ , $\sin$ , $\cos$ , $\tan$ , $\sin^{-1}$ , $\cos^{-1}$ , $\tan^{-1}$ , $\sinh$ , $\cosh^{-1}$ , $\cosh^{-1}$ , $\tanh^{-1}$ , $(-)$ )
7th	Implied multiplication of Type B functions: $2\sqrt{3}$ , Alog2, etc.
8th	Permutation (nPr), combination (nCr)
9th	Multiplication, division (×, ÷)
10th	Addition, subtraction (+, -)

# ■ Correcting and Clearing an Expression

To delete a single character or function:

1234 → **(4) (El)** → 124

To insert a character or function into a calculation:

 $123\_ \rightarrow \textcircled{SHFT} \ DEL (INS) \textcircled{4} \rightarrow 1243$ • The cursor changes from "\_" to "[]"

To clear all of the calculation you are inputting: Press [AC].

### 13. Basic Calculations

# **■** Fraction Calculations

$\frac{2}{3} + \frac{1}{2} = 1\frac{1}{6}$	2 @ 3 🛨 1 @ 2 🖃	1_1_6.
$\sqrt{4-3\frac{1}{2}=\frac{1}{2}}$	4 🗕 3 碌 1 碌 2 🖃	1_2.

Note: • Mixing fractions and decimal values in a calculation will cause the result to be displayed as a decimal value. • Fractions in calculation results are displayed after being reduced to their lowest terms.

To switch a calculation result between improper fraction and mixed fraction format: Press SHFI @ (d/c).

To switch a calculation result between fraction and decimal format: Press @

150 X 20 SHFT (%)

30.

# ■ Percent Calculations

 $150 \times 20\% = 30$ 

Calculations

Calculate what pe	ercentage of 880 is 660. (75%) 660 ⊕ 880 ⊌FF ≡ (%)	75.
Increase 2500 by	15%. (2875) 2500 <b>▼</b> 15 SHIF <b>■</b> (%) <b>+</b>	2875.
Discount 3500 by	25%. (2625) 3500 <b>X</b> 25 (%) <b>-</b>	2625.
	added to a test sample originally wis the percentage increase in weigh	
	300 <b>★</b> 500 SHFT <b>■</b> (%)	160.

What is the percentage change when a value is increased from 40 to 46? (15%) 46 - 40 SHIFT = (%) 15.

The following is the input format for a sexagesimal value: {degrees} [ seconds ] [ seco Download from Www.Somanuals.com. All Manuals Search And Download.

■ Degree, Minute, Second (Sexagesimal)

Note: You must always input something for the degrees and minutes, even if they are zero.

	2°20′30″ + 39′30″ = 3°00′00″
3°0°0.	2 ••• 20 ••• 30 ••• 🛨 0 ••• 39 ••• 30 ••• 🖃
	Convert 2°15′18″ to its decimal equivalent.
2°15°18.	2 • 15 • 18 • 1
2.255	(Converts sexagesimal to decimal.)
2°15°18.	(Converts decimal to sexagesimal.) SHFT □→ (←)

# ■ Multi-Statements (fx-82MS/85MS/300MS/350MS only)

You can use the colon character (:) to connect two or more expressions and execute them in sequence from left to right when vou press =

3+3:3×3	3 + 3 ALPHA Pol((:)3 X 3 =	6.Disp
ŕ		9.

# ■ Using Engineering Notation

A simple key operation transforms a displayed value to engineering

Transform the value 1234 to engineering notation, shifting the decimal point to the right. 1234 🖃 1234.

ENG 1.234×10<sup>3</sup> ENG 1234.×100

# ■ Calculation History (Not included on the fx-82SX PLUS)

In the COMP Mode, the calculator remembers up to approximately 150 bytes of data for the newest calculation. You can scroll through calculation history contents using (A) and (T)

2.	1 🛨 1 🖃	1+1=2
4.	2 🛨 2 🖃	2+2=4
6.	3 ∄ 3 ≡	3 + 3 = 6
4.	(Scrolls back.)	
2.	(Scrolls back again.)	

Note: Calculation history data is all cleared whenever you press [on]. when you change to a different calculation mode, or whenever you initialize modes and settings

### ■ Replay (Not included on the fx-82SX PLUS)

While a calculation result is on the display, you can press 
or to edit the expression you used for the previous calculation

$4 \times 3 + 2.5 = 14.5$	4 🕱 3 🛨 2.5 🖃	14.5
$4 \times 3 - 7.1 = 4.9$		
(Continuing)	● DEL DEL DEL ■ 7.1 ■	4.9

# ■ Answer Memory (Ans)

The last calculation result obtained is stored in Ans (answer) memory Ans memory contents are updated whenever a new calculation result is displayed.

To divide the result of 3 × 4 by 30 3 X 4 = 12. Ans÷30 (Continuing) ÷ 30 ≡ 0.4 123 + 456 = 579 579. 123 1 456 = 789 - 579 = 210(Continuing) 789 🖃 💷 210.

# ■ Variables (A, B, C, D, E, F, X, Y) (fx-82MS/85MS/300MS/350MS only)

Your calculator has eight preset variables named A, B, C, D, E, F,

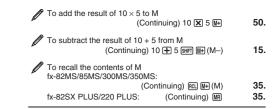
To assign the result of 3 + 5 to variable A 3 + 5 SHIFT RCL (STO) (-) (A) To multiply the contents of variable A by 10 (Continuing) ALPHA (-) (A) X 10 = 80 To recall the contents of variable A (Continuing) RCL (-) (A) 8. To clear the contents of variable A O SHIFT RCL (STO) (A)

### ■ Independent Memory (M) You can add calculation results to or subtract results from independent

To clear the contents of M

memory. The "M" appears on the display when there is any value other than zero stored in independent memory

> fx-82MS/85MS/300MS/350MS 0 SHFT RCL (STO) M+ (M) fx-82SX PLUS/220 PLUS: O SHIFT MR (Min)



Note: Variable M is used for independent memory.

#### ■ Clearing the Contents of All Memories

Independent memory and variable contents are retained even if you press AC, change the calculation mode, or turn off the calculator. Perform the following procedure when you want to clear the contents of all memories.

fx-82MS/85MS/300MS/350MS: (ON) (SHIFT) (MODE) (CLR) (1) (MCI) fx-82SX PLUS/220 PLUS: ON CR 1 (Mcl)

# 14. Function Calculations

 $\pi$ :  $\pi$  is displayed as 3.141592654, but  $\pi$  = 3.14159265358980 is used for internal calculations

e (fx-82MS/85MS/300MS/350MS only): e is displayed as 2.718281828, but e = 2.71828182845904 is used for internal calculations

sin, cos, tan, sin-1, cos-1, tan-1: Trigonometric functions. Specify the angle unit before performing calculations. See Ø

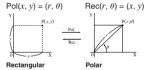
sinh, cosh, tanh, sinh-1, cosh-1, tanh-1; Hyperbolic functions. The angle unit setting does not affect calculations. See <a>\mathbb{\ell}\_2</a>.

°, r, g: These functions specify the angle unit, ° specifies degrees radians, and g grads. Input a function from the menu that appears when you perform the following key operation: SHIFT Ans (DRG►). See <u>/3</u>.

10°,  $e^x$ : Exponential functions. See  $\underline{\mathcal{U}}_4$ . log: Logarithmic function. See \$\int\_5\$.

In: Natural logarithm to base e. See \$\mathbb{\eta}\_6\$.  $x^2$ ,  $x^3$ ,  $(x^y)$ ,  $\sqrt{\phantom{x}}$ ,  $\sqrt{\phantom{x}}$ ,  $\sqrt{\phantom{x}}$ ,  $\sqrt{\phantom{x}}$ ,  $x^{-1}$ : Powers, power roots, and reciprocals. See /7.

Pol, Rec: Pol converts rectangular coordinates to polar coordinates, while Rec converts polar coordinates to rectangular coordinates See /8.



Specify the angle unit before performing calculations. Calculation result  $\theta$  is displayed in the range of  $-180^{\circ} < \theta \le 180^{\circ}$ 

sin 30 =

0.5

30.

90.

45.

Coordinates (Rec) Coordinates (Pol)

x!: Factorial function. See  $\mathbb{Z}_9$ . Ran#: Generates a 3-digit pseudo random number that is less than

1. See <u>\$\mathcal{Q}\_{10}\$.</u> Ranint# (fx-82SX PLUS/220 PLUS only): For input of the function of the form  $\operatorname{RanInt}(a, b)$ , which generates a random integer within the range of a to b. See  $\mathcal{D}_{11}$ .

nPr, nCr: Permutation (nPr) and combination (nCr) functions. See

Rnd: The argument of this function is made a decimal value and then rounded in accordance with the current number of display digits setting (Norm, Fix, or Sci). With Norm 1 or Norm 2, the argument is rounded off to 10 digits. See <u>\$\mathcal{D}\_{13}\$</u>.

Note: Using functions can slow down a calculation, which may delay display of the result. To interrupt an ongoing calculation before its result appears, press AC

# ■ Examples

**1** sin 30°= 0.5 **Deg** 

sin<sup>-1</sup>0.5 = 30° Deg SHIFT sin (sin-1) 0.5 hyp sin (sinh) 1 = 1.175201194 **2** sinh 1 = 1.175201194  $cosh^{-1} 1 = 0$ hyp SHIFT COS (COSh-1) 1 **3**  $\pi/2$  radians = 90°, 50 grads = 45° ( SHIFT EXP  $(\pi)$   $\stackrel{.}{\div}$  2 ) SHIFT Ans  $(\mathsf{DRG} \blacktriangleright)$  2  $(\mathsf{R})$ 50 SHIFT Ans (DRG►) 3 (G) = **4** To calculate  $e^5 \times 2$  to three significant digits (Sci 3) SHIFT In  $(e^x)$  5 **X** 2 **E** 2.97×10<sup>2</sup> MODE ---- 2 (Sci) 3

**5** log 1000 = 3 log 1000 = **6** To calculate In 90 (= log<sub>e</sub> 90) to three significant digits (Sci 3)

MODE ---- 2 (Sci) 3 In 90 = 4.50×10°

 $7 1.2 \times 10^3 = 1200$ 1.2 🕱 10 ∧ 3 🖃  $(5^2)^3 = 15625$ 

 $(5x^2)x^3 =$ 

15625

 $5 \text{ SHIFT } \bigwedge (^x \sqrt{\phantom{x}}) 32 =$ To calculate  $\sqrt{2} \times 3 (= 3\sqrt{2} = 4.242640687...)$  to three decimal places (Fix 3) MODE ---- 1 (Fix) 3 **√**2**×**3**=** 4 243 **8** To convert rectangular coordinates  $(\sqrt{2}, \sqrt{2})$  to polar coordinates Deg fx-82MS/85MS/300MS/350MS: Pol( 7 2 ) 7 2 ) = r=2.

ullet Press RCL  $\hbox{$_{
m CS}$}$  (E) to display the value of r, or RCL  $\hbox{$_{
m TR}$}$  to display the value of  $\theta$ .

fx-82SX PLUS/220 PLUS:

Pol( ~ 2 ( (,) ~ 2 ) = r=2. SHIFT Rec(  $(y,\theta)$  $\theta = 45$ .

RCL (tan) (F)

 $\theta$ =45.

• Press SHIFT Pol( (x,r)  $\equiv$  to display the value of r, or SHIFT  $(v,\theta)$  to display the value of  $\theta$ 

To convert polar coordinates ( $\sqrt{2}$ , 45°) to rectangular coordinates Deg

fx-82MS/85MS/300MS/350MS:

SHIFT Pol((Rec() ▼ 2 → 45 = x=1. RCL (tan) (F) y = 1.

• Press  $\mathbb{R} \subseteq \mathbb{R} \subseteq \mathbb{R}$  (E) to display the value of x, or  $\mathbb{R} \subseteq \mathbb{R} \subseteq \mathbb{R}$ display the value of y.

fx-82SX PLUS/220 PLUS: Rec() 7 2 ((,) 45 y = 1. SHIFT Rec(  $(y, \theta)$ 

• Press SHIFT Pol((x,r) = to display the value of x, or SHIFT  $(y,\theta)$  to display the value of y

**9** (5+3)! = 40320 (5 + 3) SHF  $x^2(x!)$ 40320.

10 To obtain two random three-digit integers 1000 SHIFT • (Ran#) =

48. (Actual results will differ.)

459

11 To generate random integers in the range of 1 to 6 (fx-82SX PLUS/220 PLUS only)

SHIFT 2 (RanInt) 1 SHIFT ((,)6) = 2 (Actual results will differ.)

12 To determine the number of permutations and combinations possible when selecting four people from a group of 10

Permutations: 10 SHIFT (nPr) 4 = Combinations: 10 [nCr] 4 (=) 210.

13 To perform the following calculations when Fix 3 is selected for the number of display digits:  $10 \div 3 \times 3$  and Rnd( $10 \div 3$ )  $\times 3$ 

MODE ---- 1 (Fix) 3 10 **∃** 3 **X** 3 **≡** 10.000 10 ÷ 3 = SHFT 0 (Rnd) **X** 3 = 9.999

### 15. Statistical Calculations (SD, REG\*) \*fx-82MS/85MS/300MS/350MS only

To select this type of statistical calculation: (Regression formula shown in parentheses)	Perform this key operation:
Single-variable (X)	MODE 2 (SD)
Paired-variable (X, Y), linear regression $(y = A + Bx)$	MODE 3 (REG) 1 (Lin)
Paired-variable (X, Y), logarithmic regression $(y = A + Blnx)$	MODE 3 (REG) 2 (Log)
Paired-variable (X, Y), $e$ exponential regression $(y = Ae^{Bx})$	MODE 3 (REG) 3 (Exp)
Paired-variable (X, Y), power regression $(y = Ax^B)$	1 (Pwr) (MODE 3 (REG) (Pwr)
Paired-variable (X, Y), inverse regression $(y = A + B/x)$	1000 3 (REG) № 2 (Inv)
Paired-variable (X, Y), quadratic regression $(y = A + Bx + Cx^2)$	1000 3 (REG) <b>⑤</b> 3 (Quad)

# ■ Inputting Data

- In the SD Mode and REG Mode, the M+ key operates as the DT
- Always start data input with SIF LOOD (CLR) 1 (ScI) (CLR)
- Input data using the key sequence shown below. SD Mode: <x-data> DT REG Mode: <x-data> • <y-data> • T
- DT DT inputs the same data twice.
- You can also input multiple entries of the same data using (;) (SHIFT ) (;) on the fx-82SX PLUS/220 PLUS)

### ■ Data Input Precautions

• While inputting data or after inputting data is complete, you can use the (a) and (v) keys to scroll through data you have input. If you input multiple entries of the same data using SHFT (;) (SHFT)(;) on the fx-82SX PLUS/220 PLUS) to specify the data frequency (number of data items) as described above, scrolling through data shows both the data item and a separate screen for the data frequency (Freq).

• Input the new value and then press the \equiv key to replace the old value with the new one. This also means that if you want to perform some other operation, you should always press the AC key first to exit data display

display registers the value you input as a new data item, and leaves the old value as it is

 You can delete a data value displayed using (♠) and (♥) by pressing SHFT MH (CL). Deleting a data value causes all values following it to be shifted up.

• The message "Data Full" appears and you will not be able to input any more data if there is no memory left for data storage. If this happens, press the E key to display the screen shown below. Press 2 to exit data input without registering EditOFF ESC

the value you just input.

Press 1 if you want to register the value

you just input. If you do this, however, you will not be able to display or edit any of the data you have input.

 After inputting statistical data in the SD Mode or REG Mode, you will be unable to display or edit individual data items any longer after perform either the following operations: changing to another mode; changing the regression type.

· Entering the REG Mode and selecting a regression type (Lin, Log, Exp, Pwr, Inv, Quad) clear variables A through F, X, and Y.

• Do not use variables A through F. X. or Y to store data when performing statistical calculations.

#### ■ Obtaining Statistical Values from Input Data

Supported statistical variables and the keys you should press to recall them are shown below

fx-82SX PLUS/220 PLUS:

Sum:  $\Sigma x^2$ .  $\Sigma x$ . Number of Items: n. Mean:  $\bar{x}$ . Population Standard Deviation:  $\sigma_x$ , Sample Standard Deviation:  $s_x$ SHIFT [4] to [9]

### fx-82MS/85MS/300MS/350MS:

For single-variable statistical calculations, the variables marked with an asterisk (\*) are available

Sum:  $\Sigma x^{2*}$ ,  $\Sigma x^*$ ,  $\Sigma y^2$ ,  $\Sigma y$ ,  $\Sigma xy$ ,  $\Sigma x^3$ ,  $\Sigma x^2y$ ,  $\Sigma x^4$ , Number of Items:  $n^*$ Regression only)

Mean:  $\bar{x}^{\star}$ ,  $\bar{y}$ , Population Standard Deviation:  $\sigma_{x}^{\star}$ ,  $\sigma_{y}$ , Sample Standard Deviation:  $Sx^*$ , Sy

.. SHIFT 2 (S-VAR) 1 to 3 .. SHIFT 2 (S-VAR) 1 to 3 ÿ, σ<sub>ν</sub>, s<sub>ν</sub> ...

Regression Coefficients: A, B, Correlation Coefficient: r Regression Coefficients for Quadratic Regression: A, B, C SHIFT 2 (S-VAR) ( ) 1 to 3

Fstimated Values: x̂.

Estimated Values for Quadratic Regression:  $\hat{x}_1$ ,  $\hat{x}_2$ ,  $\hat{y}$ SHIFT 2 (S-VAR) (S (or 3)

•  $\hat{x}$ ,  $\hat{x}_1$ ,  $\hat{x}_2$  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.

n To calculate the mean  $(\bar{x})$  and population standard deviation ( $\sigma_x$ ) for the following data: 55, 54, 51, 55, 53, 53, 54 52

MODE 2 (SD)

55 OT 54 OT 51 OT 55 OT 53 OT OT 54 OT 52 OT

fx-82SX PLUS/220 PLUS: SHFT (7)(x̄) (= 53.375 SHIFT 8  $(\sigma_x)$  = 1.316956719

fx-82MS/85MS/300MS/350MS:

SHIFT 2 (S-VAR) 1  $(\bar{x})$ 53.375 SHFT [2] (S-VAR) [2] (G<sub>x</sub>) 1.316956719

fx-82MS/85MS/300MS/350MS: To calculate the linear regression and logarithmic regression correlation coefficients (r) 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. MODE 3 (REG) 1 (Lin) MODE ---- 1 (Fix) 3

20 • 3150 0 110 • 7310 0 200 • 8800 0 290 • 0.923

MODE [3] (REG) [2] (Log)

20 • 3150 0 110 • 7310 0 200 • 8800 0 290 • 9310 DT SHIFT  $2 (S-VAR) \bigcirc \bigcirc 3 (r) \equiv$ 0.998

SHIFT 2 (S-VAR) **▶** 1 (A) **≡** -3857.984 SHIFT 2 (S-VAR) **▶** 2 (B) **≡** 2357.532

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

### ■ 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 v in the regression formula.

**7** To determine the estimate value for y when x = 160 in the regression formula produced by logarithmic regression of the data in \( \bigset\_2 \). Specify Fix 3 for the result. (Perform the following operation after completing the operations in  $\mathbb{Z}_2$ .) 160 SHFT (2) (S-VAR) (▶ (▶ (2) (ŷ) (□) 8106.898

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

# 16. Calculation Ranges, Number of **Digits, and Precision**

# ■ Calculation Range and Precision

Calculation Range: ±1 × 10<sup>-99</sup> to 9.999999999 × 10<sup>99</sup> or 0 Number of Digits for Internal Calculation: 15 digits Precision: In general, ±1 at the 10th digit for a single calculation. Precision for exponential display is ±1 at the least significant digit Errors are cumulative in the case of consecutive calculations.

### ■ Function Calculation Input Ranges and Precision

	Functions	Input Range		
og,	25110113	DEG	$0 \le  x  < 9 \times 10^9$	
	sinx	RAD	$0 \le  x  < 3 \times 10$ $0 \le  x  < 157079632.7$	
	cosx	_	$0 \le  x  < 1 \times 10^{10}$	
		DEG	Same as $\sin x$ , except when $ x  = (2n-1) \times 90$ .	
		RAD	Same as sinx, except when $ x  = (2n-1) \times \pi/2$	
	tanx	GRA	Same as $\sin x$ , except when $ x  = (2n-1) \times 100$ .	
	sin <sup>-1</sup> x cos <sup>-1</sup> x	0 ≦   <i>x</i>	≦ 1	
	tan-1x	$0 \le  x  \le 9.999999999 \times 10^{99}$		
	sinhx coshx	0 ≦  x	0 ≤  x  ≤ 230.2585092	
	sinh-1x	$0 \le  x  \le 4.999999999 \times 10^{99}$		
	cosh-1x	1 ≦ <i>x</i>	≤ 4.999999999 × 10 <sup>99</sup>	
	tanhx	0 ≤   <i>x</i>	≤ 9.999999999 × 10 <sup>99</sup>	
	tanh-1x	0 ≦   <i>x</i>	≤ 9.99999999 × 10 <sup>-1</sup>	
	logx/lnx	0 < <i>x</i>	$\leq 9.999999999 \times 10^{99}$	
	10 <sup>x</sup>	-9.99	$9999999 \times 10^{99} \le x \le 99.99999999$	
	e <sup>x</sup>	-9.99	$9999999 \times 10^{99} \le x \le 230.2585092$	
	$\sqrt{x}$	0 ≦ <i>x</i>	< 1 × 10 <sup>100</sup>	
	X <sup>2</sup>	x  < 1	1 × 10 <sup>50</sup>	
	X <sup>-1</sup>	x  < 1	$1 \times 10^{100}; x \neq 0$	
	3√x	x  < 1	I × 10 <sup>100</sup>	
	x!	0 ≤ <i>x</i>	$\leq$ 69 (x is an integer)	
	nPr	$0 \le n < 1 \times 10^{10}, 0 \le r \le n \text{ (n, r are integers)}$ $1 \le \{n!/(n-r)!\} < 1 \times 10^{100}$		
	nCr	$0 \le n < 1 \times 10^{10}, 0 \le r \le n \ (n, r \text{ are integers})$ $1 \le n!/r! < 1 \times 10^{100} \text{ or } 1 \le n!/(n-r)! < 1 \times 10^{100}$		
	Pol(x, y)		≦ 9.999999999 × 10 <sup>99</sup> ₹ ≦ 9.999999999 × 10 <sup>99</sup>	
	$Rec(r, \theta)$		$0 \le r \le 9.99999999 \times 10^{99}$ $\theta$ : Same as $\sin x$	
	03.33	The d	$c<1\times 10^{100}; 0 \le b, c$ isplay seconds value is subject to an error of the second decimal place.	
	01 77	Decin	l × 10 <sup>100</sup> nal ↔ Sexagesimal Conversions ´≦  x  ≦ 9999999°59´	
	x <sup>y</sup>	$x > 0: -1 \times 10^{100} < y \log x < 100$ x = 0: y > 0 $x < 0: y = n, \frac{1}{2n+1}$ (n is an integer)		
	∜y	y > 0: y = 0: y < 0	However: $-1 \times 10^{100} < y \log  x  < 100$ $y > 0: x \neq 0, -1 \times 10^{100} < 1/x \log y < 100$ y = 0: x > 0 $y < 0: x = 2n + 1, \frac{1}{n} (n \neq 0; n \text{ is an integer})$	
	$a^b l_c$	However: -1 × 10 <sup>100</sup> < 1/x log  y  < 100  Total of integer, numerator, and denominator must be 10 digits or less (including division marks).		
wnload <sup>•</sup>	RanInt#(a, b)		; $ a $ , $ b  <$ 1 × 10 <sup>10</sup> ; $b - a <$ 1 × 10 <sup>10</sup> $(a, b \text{ are ars})$ anuals.com. All Manuals Search And	

#### · Precision is basically the same as that described under "Calculation Range and Precision", above.

- Calculations that use any of the functions or settings shown below require consecutive internal calculations to be performed, which can cause accumulation of error that occurs with each calculation.  $x^y$ ,  $x^y$ , coefficient
- Error is cumulative and tends to be large in the vicinity of a function's singular point and inflection point.
- Accumulation of errors tends to occur during statistical calculations involving data in which there is a large number of decimal places and there is little difference between data items. Input of statistical data is limited to six decimal places

### 17. Error Messages

The calculator will display an error message whenever an error occurs for any reason during a calculation.

- be positioned at the location where the error occurred, ready for input. Make the necessary corrections to the calculation and execute it again. (Not included on the fx-82SX PLUS)
- · Press AC to return to the calculation screen. Note that this also clears the calculation that contained the error.

#### Math FRROR

Cause: • The intermediate or final result of the calculation you are performing exceeds the allowable calculation range. • Your input exceeds the allowable input range. • The calculation you are performing contains an illegal mathematical operation (such as division by zero)

Action: • Check the input values and reduce the number of digits • When using independent memory or a variable as the argument of a function, make sure that the memory or variable value is within the allowable range for the function.

### Stack ERROR

Cause: The calculation you are performing has caused the capacity of the numeric stack or the command stack to be exceeded.

Action: • Simplify the calculation expression. • Try splitting the calculation into two or more parts.

### Syntax FRROR

Cause: There is a problem with the format of the calculation you are performing

Action: Make necessary corrections.

### Arg ERROR

Cause: Improper use of an argument Action: Make necessary corrections.

# 18. Before Assuming Malfunction of the Calculator...

Perform the following steps whenever an error occurs during a calculation or when calculation results are not what you expected Note that you should make separate copies of important data before performing these steps

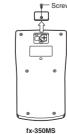
- 1. Check the calculation expression to make sure that it does not contain any errors.
- 2. Make sure that you are using the correct mode for the type of calculation you are trying to perform
- 3. If the above steps do not correct your problem, press the ON
- 4. Initialize all modes and settings. See "Initializing Calculator

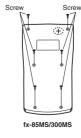
# 19. Replacing the Battery

Important: Removing the battery will cause all of the calculator's memory contents to be deleted

- 1. Press SHET AC (OFF) to turn off the calculator.
- To ensure that you do not accidentally turn on power while replacing the battery, slide the hard case onto the front of the calculator (fx-350MS).
- 2. Remove the cover as shown in the illustration and replace the battery, taking care that its plus (+) and minus (-) ends are facing







220 PLUS 3. Replace the cover

- 4. Initialize the calculator. See "3. Initializing the Calculator"
- . Do not skip the above step!

20. Specifications

fx-350MS: Button battery LR44 (GPA76) × 1

fx-350MS: 9.000 hours (continuous operation)

0.0001 W (fx-82MS/82SX PLUS/220 PLUS/350MS)

Operating Temperature: 0°C to 40°C (32°F to 104°F)

fx-82MS/82SX PLUS/220 PLUS: AA-size battery R6P (SUM-3) × 1

fx-85MS/300MS: Built-in solar cell: button battery LR44 (GPA76)

fx-82MS/82SX PLUS/220 PLUS: 17,000 hours (continuous display

fx-85MS/300MS: 3 years (based on one hour of operation per day)

Dimensions (H×W×D)/Approximate Weight (including the battery)

18.6 × 85 × 156 mm

19 5 × 78 × 155 mm

12.2 × 85 × 155 mm

 $/4'' \times 3^3/8'' \times 6^1/8''$ 

 $^{3}/_{4}'' \times 3^{1}/_{8}'' \times 6^{1}/_{8}''$ 

 $^{1}/_{2}'' \times 3^{3}/_{8}'' \times 6^{1}/_{8}''$ 

115 a

115 g

100 a

(4.1 oz)

(3.5 oz)

(4.1 oz)

Power Requirements

**Approximate Battery Life:** 

of flashing cursor)

fy-82MS

fx-85MS

fx-300MS

fx-350MS

fx-82SX PLUS

fx-220 PLUS

Power Consumption:

Manufacturer: CASIO COMPUTER CO., LTD. 6-2. Hon-machi 1-chome Shibuya-ku, Tokyo 151-8543, Japan

Responsible within the European Union: CASIO EUROPE GmbH Casio-Platz 1 22848 Norderstedt, Germany



This mark applies in EU countries only.

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