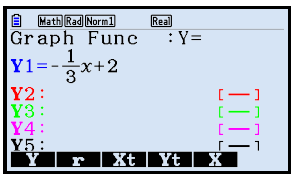
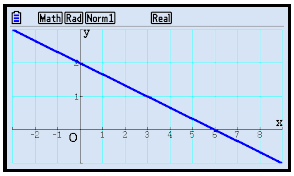
CHAPTER 1 - GRAPHING LINEAR FUNCTIONS

Casio fx-CG50

To draw the graph of a linear function such as $y = -\frac{1}{3}x + 2$, select **Graph** from the Main Menu, and enter $-\frac{1}{3}x + 2$ into **Y1**.



Press F6 (**DRAW**) to draw the graph.



CHAPTER 1 - SOLVING SIMULTANEOUS EQUATIONS

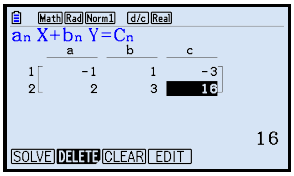
Casio fx-CG50

To solve the system $\begin{cases} y = x - 3 \\ 2x + 3y = 16 \end{cases}$ using technology, first write the system in the form $\begin{cases} -x + y = -3 \\ 2x + 3y = 16. \end{cases}$

Press **MENU**, and select **Equation**.

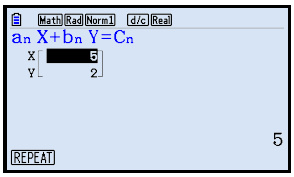
Press F1 (**Simultaneous**), and press F1 (**2**) to use 2 unknowns.

Enter the values as shown alongside.



Press F1 (**SOLVE**), and the results will be displayed.

So, $x = 5$ and $y = 2$.

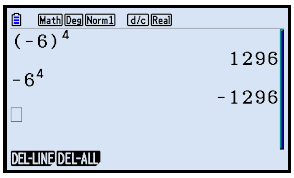


CHAPTER 3 - CALCULATING EXPONENTS

Casio fx-CG50

The **Casio fx-CG50** has an exponent key that looks like $\wedge$. We type the base first, press the exponent key, then enter the index. We use the bracket keys (and) when we raise a negative number to a power.

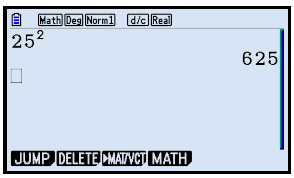
For example, to evaluate $(-6)^4$ we type ((−) 6) $\wedge$ 4 EXE.



If we typed (−) 6 $\wedge$ 4 EXE, the calculator would think we meant -6^4.

Numbers can be squared on the **Casio fx-CG50** calculator using the special key x^2.

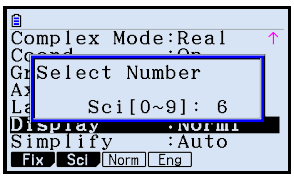
For example, to evaluate 25^2 we type 25 x^2 EXE.



CHAPTER 3 - SCIENTIFIC NOTATION

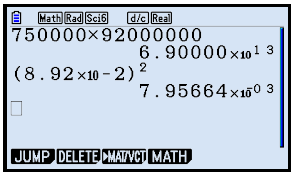
Casio fx-CG50

To change the display settings on your calculator, press SHIFT MENU (SET UP), then scroll down to **Display**.



To display each result in scientific notation with an accuracy of 6 significant figures, press F2 (**Sci**) 6 EXE. Press EXIT when you are done.

To find $750\,000 \times 92\,000\,000$, press 750 000 $\times$ 92 000 000 EXE.



We enter values in scientific notation using the $\times 10^x$ button.

To find $(8.92 \times 10^{-2})^2$, press (8.92 $\times 10^x$ (−) 2) x^2 EXE.

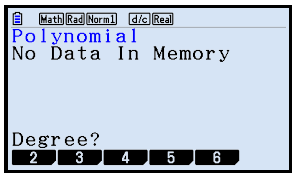
CHAPTER 4 - SOLVING POLYNOMIAL EQUATIONS

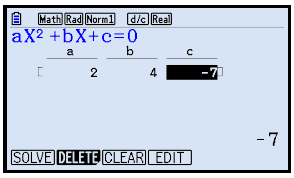
Casio fx-CG50

To solve the quadratic equation $2x^2 + 4x = 7$, we rearrange to polynomial form to get $2x^2 + 4x - 7 = 0$.

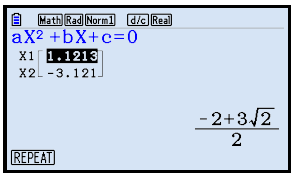
Select **Equation** from the Main Menu, then press F2 (**Polynomial**) to access the **polynomial solver**.

Next press F1 (**2**) to select polynomial degree 2, then enter $2x^2 + 4x - 7 = 0$ as shown.





Press EXE to view the results.

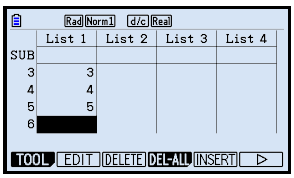


So, $x = \frac{-2+3\sqrt{2}}{2} \approx 1.12$ or $x = \frac{-2-3\sqrt{2}}{2} \approx -3.12$.

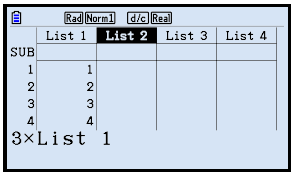
CHAPTER 5 - GENERATING SEQUENCES

Casio fx-CG50

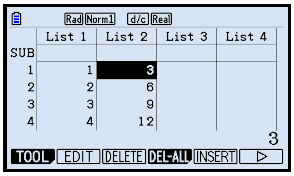
To find the first five terms of the sequence represented by $\{3n\}$, select **Statistics** from the Main Menu, and enter the numbers $1, 2, 3, 4, 5$ into **List 1**.



Move the cursor to the heading of **List 2** and press 3 [×] [SHIFT] 1 (**List**) 1 [EXE].



So, the first five terms of the sequence are $3, 6, 9, 12, 15$.



CHAPTER 5 - GEOMETRIC SEQUENCES

Casio fx-CG50

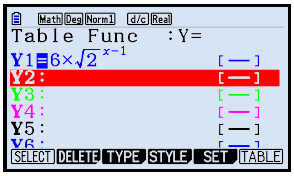
Find the first term of the sequence $6,\ 6\sqrt{2},\ 12,\ 12\sqrt{2},\ ....$ which exceeds 1400.

The sequence is geometric with $u_1 = 6$ and $r = \sqrt{2}$

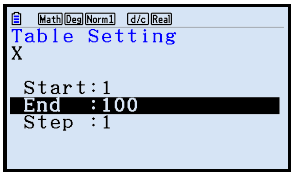
$$\therefore\ u_n = 6 \times (\sqrt{2})^{n-1}$$

We need to find n such that $u_n > 1400$.

Select **Table** from the Main Menu and set up the equation as shown.

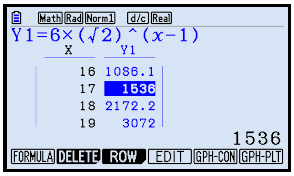


Press F5 (**SET**) to set up the table. Make sure that **End** is sufficiently large. Press **EXIT** when you are done.



Press F6 (**TABLE**) to view the table of values and then scroll down to the first term that exceeds 1400.

The first term to exceed 1400 is $u_{17} = 1536$.

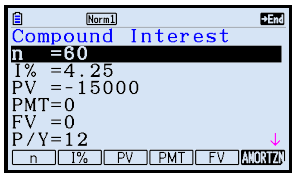


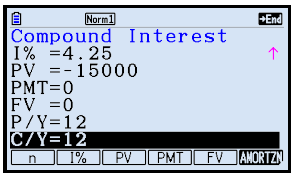
CHAPTER 5 - TVM SOLVER

Casio fx-CG50

Sally invests $\$15\,000$ in an account that pays 4.25% p.a. compounded monthly. To find the value of Sally's investment after 5 years, select **Financial** from the Main Menu, and press F2 (**Compound Interest**).

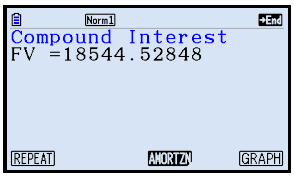
Set up the screen as shown.





Press F5 (**FV**) to find the future value of the investment.

So, the value of the investment after 5 years is $\approx \$18\,544.53$.



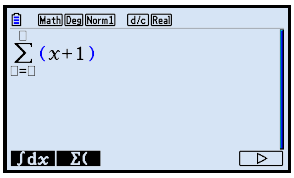
CHAPTER 5 - SIGMA NOTATION

Casio fx-CG50

To evaluate $\sum_{k=1}^{7}(k+1)$, select **Run-Matrix** from the Main Menu, then press F4 (**MATH**), F6 (▷), F2 ($\sum(\ )$.

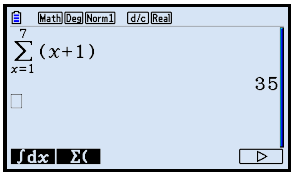
First enter the formula in the brackets by pressing X, θ, T $+$ 1.

Then, enter the limits of the sum by pressing ▶ X, θ, T ▶ 1 ▶ 7.



Press EXE to evaluate the sum.

So, $\sum_{k=1}^{7}(k+1) = 35$.

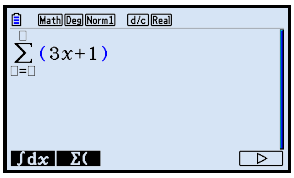


CHAPTER 5 - EVALUATING SERIES

Casio fx-CG50

We can write the series $4 + 7 + 10 + ...$ to 50 terms as $\sum_{k=1}^{50}(3k+1)$.

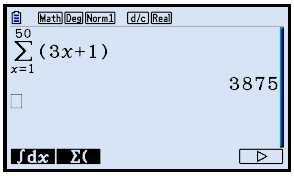
To evaluate $\sum_{k=1}^{50}(3k+1)$, select **Run-Matrix** from the Main Menu, press F4 (**MATH**), F6 (▷), F2 ($\sum$(), then enter 3 X, θ, T $+$ 1.



Enter the limits of the sum by pressing ▶ X, θ, T ▶ 1 ▶ 50.

To evaluate the sum press EXE.

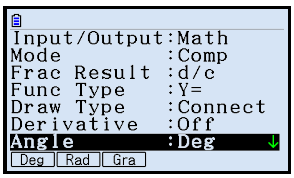
So, $\sum_{k=1}^{50}(3k+1) = 3875$.



CHAPTER 7 - TRIGONOMETRIC RATIOS

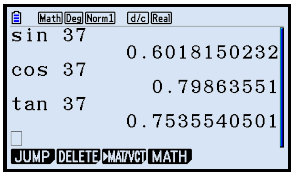
Casio fx-CG50

To check that your calculator is in DEGREE mode, press SHIFT MENU (SET UP), and make sure the **Angle** setting is set to **Deg**.



Press EXIT when you are done.

To find the trigonometric ratios of the angle $37°$, press sin 37 EXE cos 37 EXE tan 37 EXE.

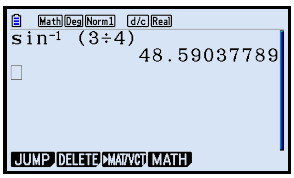


Casio fx-CG50

If $\sin\theta = \frac{3}{4}$, then $\theta = \sin^{-1}(\frac{3}{4})$.

To find $\sin^{-1}(\frac{3}{4})$, press SHIFT sin $(\sin^{-1})$ (3 ÷ 4) EXE.

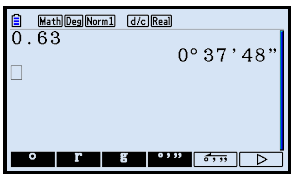
So, $\theta \approx 48.6°$.



CHAPTER 8 - CONVERTING DEGREES INTO MINUTES AND SECONDS

Casio fx-CG50

To convert $0.63°$ into minutes and seconds, press 0.63 EXE, then press OPTN, F6 (▷), F5 (ANGLE), F5 ($\circ\,'\,''$).



So, $0.63°$ is equivalent to 37 minutes and 48 seconds.

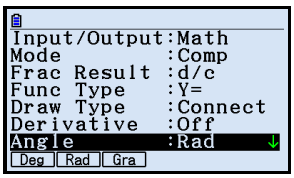
CHAPTER 8 - DEGREES AND RADIANS

Casio fx-CG50

To change between degree and radian mode, select **Run-Matrix** from the Main Menu.

Press SHIFT MENU, then use ▼ to scroll down to **Angle**. Press F1 (**Deg**) to select degree mode or F2 (**Rad**) to select radian mode.

Press EXIT when you are done.

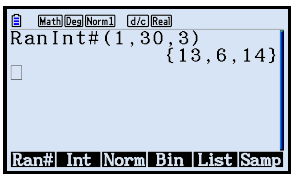


CHAPTER 12 - GENERATING RANDOM NUMBERS

Casio fx-CG50

To generate three random integers between 1 and 30 (inclusive), select **Run-Matrix** from the Main Menu, and press OPTN, F6 (▷), F3 (**PROB**), F4 (**RAND**), F2 (**Int**).

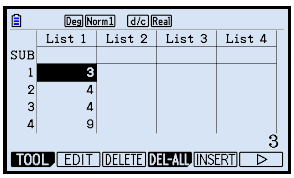
Then, press 1 , 30 , 3) EXE.



CHAPTER 13 - FINDING THE MEASURES OF CENTRE

Casio fx-CG50

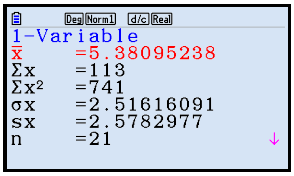
To find the mean, median and mode of $3, 4, 4, 9, 8, 8, 6, 4, 7, 9, 1, 3, 5, 3, 5, 9, 8, 6, 3, 7, 1$, select **Statistics** from the Main Menu, and enter the data into **List 1**.

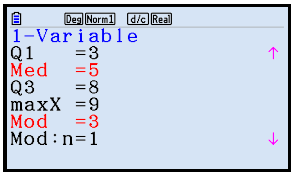


Press F6 (▷) until the **GRAPH** icon is in the bottom left corner of the screen, then press F2 (**CALC**), F6 (**SET**), and make sure the screen is set up as shown.

Press **EXIT**, then F1 (**1-VAR**) to view the statistics.

So, the mean ≈ 5.38, the median $= 5$, and the mode $= 3$.





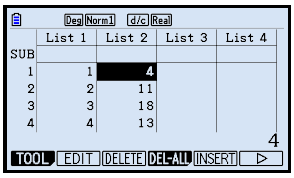
CHAPTER 13 - MEASURES OF CENTRE FROM A FREQUENCY TABLE

Casio fx-CG50

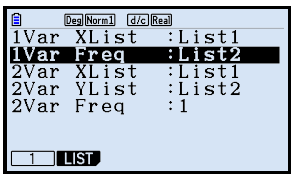
Find the measures of centre for the data in the table alongside.

Data	*Frequency*
1	4
2	11
3	18
4	13
5	7
6	2

To obtain the measures of centre, first select **Statistics** from the Main Menu. Enter the data values into **List 1**, and the frequency values into **List 2**.

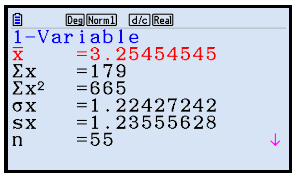


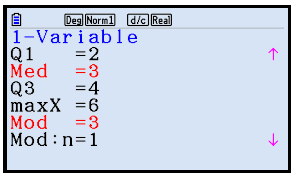
Press F6 (▷) until **GRAPH** appears in the bottom left corner of the screen. Press F2 (**CALC**), F6 (**SET**), and change the **1Var Freq** variable to **List 2** as shown.



Press **EXIT**, then F1 (**1-VAR**) to view the statistics.

So, the mean ≈ 3.25, the median $= 3$, and the mode $= 3$.





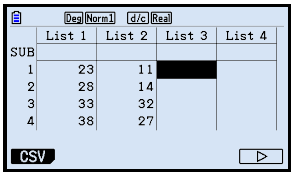
CHAPTER 13 - ESTIMATING THE MEAN OF GROUPED DATA

Casio fx-CG50

The table below shows the ages of bus drivers. Estimate the mean age, to the nearest year.

Score	21 – 25	26 – 30	31 – 35	36 – 40	41 – 45	46 – 50	51 – 55
Frequency	11	14	32	27	29	17	7

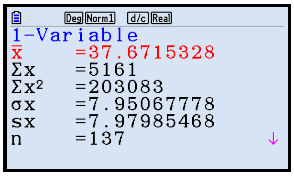
To estimate the mean of the data above, first select **Statistics** from the Main Menu. Enter the mid-interval values into **List 1**, and the frequency values into **List 2**.



Press F6 (▷) until **GRAPH** appears in the bottom left corner of the screen. Press F2 (**CALC**), F6 (**SET**), and change the **1Var Freq** variable to **List 2** as shown.

Press **EXIT**, then F1 (**1-VAR**) to view the statistics.

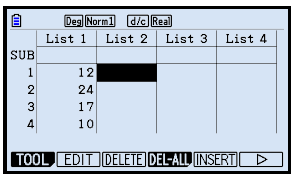
So, the mean age ≈ 38.



CHAPTER 13 - FINDING THE INTERQUARTILE RANGE

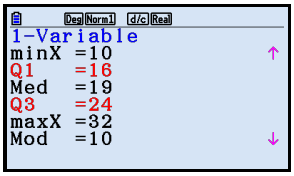
Casio fx-CG50

To find the lower and upper quartiles of $12, 24, 17, 10, 16, 29, 22, 18, 32, 20,$ start by selecting **Statistics** from the Main Menu, and enter the data into **List 1**.



Press F6 (▷) until the **GRAPH** icon is in the bottom left corner of the screen, then press F2 (**CALC**), then F6 (**SET**), and make sure the screen is set up as shown.

Press **EXIT**, then F1 (**1-VAR**) to view the statistics.



The lower quartile is $Q_1 = 16,$ and the upper quartile is $Q_3 = 24.$

So, the $\text{IQR} = Q_3 - Q_1 = 24 - 16 = 8.$

CHAPTER 13 - BOX AND WHISKER DIAGRAMS

Casio fx-CG50

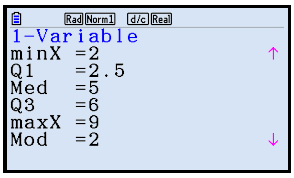
To find the five-number summary of $8, 2, 3, 9, 6, 5, 3, 2, 2, 6, 2, 5, 4, 5, 5, 6,$ start by entering the data into **List 1**.

Press F6 (▷), until the **GRAPH** icon is in the bottom left corner of the screen, then press F2 (**CALC**), F6 (**SET**), and make sure the screen is set up as shown.

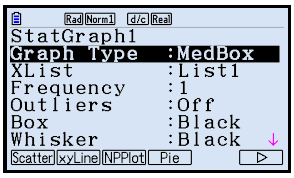
Press **EXIT**, then F1 (**1-VAR**) to view the statistics.

So, the five-number summary is:

$$\text{minimum} = 2,\ Q_1 = 2.5,\ \text{median} = 5,\ Q_3 = 6,\ \text{maximum} = 9.$$

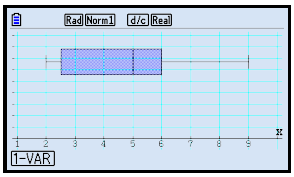


To draw a box plot for the data press **EXIT**, then **EXIT** to return to the screen with the **GRAPH** icon in the bottom left corner, then press F1 (**GRAPH**), F6 (**SET**), and set up the screen as shown. Press **EXIT** when you are done.



Press F1 (**GRAPH1**) to draw the box plot.

So, range $= \max - \min = 9 - 2 = 7$, and $\text{IQR} = Q_3 - Q_1 = 6 - 2.5 = 3.5$.



CHAPTER 13 - STANDARD DEVIATION

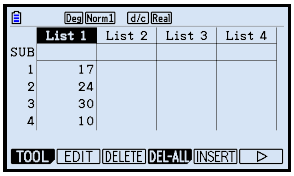
Casio fx-CG50

Kylie is interested in the ages of spectators at a rugby match. She selects a sample of 30 spectators. Their ages are:

17 24 30 10 42 48 37 19 28 53 29 40 11 21 9 43 22 59 46 52 31 13 7 26 32 47 22 15 26 42.

To find the sample standard deviation, first select **Statistics** from the Main Menu.

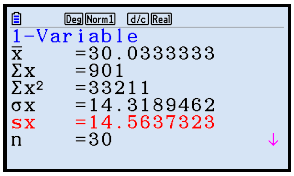
Enter the data into **List 1** as shown alongside.



Press F6 (▷) until the **GRAPH** icon is in the bottom left corner of the screen, then press F2 (**CALC**), F6 (**SET**), and set up the screen as shown alongside.

Press EXIT, then F1 (**1-VAR**) to view the statistics.

So, the sample standard deviation is $s \approx 14.6$ years.



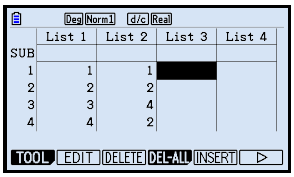
CHAPTER 13 - STANDARD DEVIATION FROM A FREQUENCY TABLE

Casio fx-CG50

Find the population standard deviation of the data alongside.

Value	1	2	3	4	5
Frequency	1	2	4	2	1

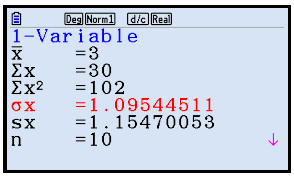
To find the standard deviation, first select **Statistics** from the Main Menu, enter the data values into **List 1**, and the frequency values into **List 2** as shown.



Press F6 (▷) until the **GRAPH** icon is in the bottom left corner of the screen, then press F2 (**CALC**), F6 (**SET**), and make sure the screen is set up as shown.

Press **EXIT**, then F1 (**1-VAR**) to view the statistics.

So, $\sigma \approx 1.10$.



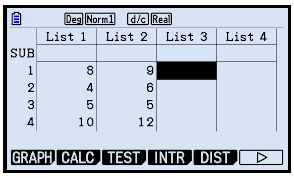
CHAPTER 17 - DRAWING SCATTER DIAGRAMS

Casio fx-CG50

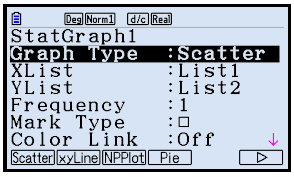
Draw a scatter diagram of the following data set:

x	8	4	5	10	8	3	6
y	9	6	5	12	7	4	5

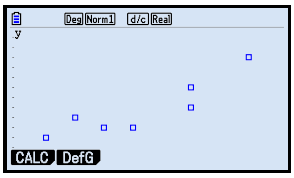
Step 1: Enter the x-values into **List 1** and the y-values into **List 2**.



Step 2: Press F1 (**GRAPH**), F6 (**SET**), and set up **StatGraph1** as shown.



Step 3: Press **EXIT**, then F1 (**GRAPH1**) to draw the scatter diagram.



CHAPTER 17 - FITTING TRIGONOMETRIC MODELS TO DATA

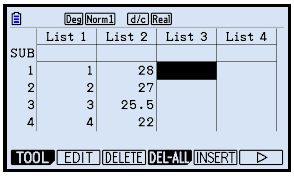
Casio fx-CG50

The mean monthly maximum temperatures for Cape Town, South Africa are shown below:

Month (t)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temperature $(T\,°\text{C})$	28	27	25.5	22	18.5	16	15	16	18	21.5	24	26

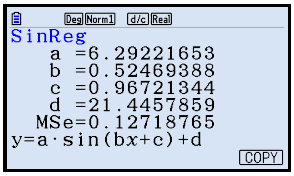
To model the data with a trigonometric function of the form $T = a\sin(b(t-c)) + d$, where Jan $\equiv 1$, Feb $\equiv 2$, and so on, first select **Statistics** from the Main Menu.

Enter the values for *Month* in **List 1**, and the values for *Temperature* in **List 2**, as shown alongside.



Press F6 (▷) until the **GRAPH** icon is in the bottom left corner of the screen, then press F2 (**CALC**), F6 (**SET**), and make sure the screen is set up as shown.

Press EXIT, F3 (**REG**), F6 (▷), then F4 (**Sin**) to find a trigonometric model for the data.



So, $T \approx 6.29\sin(0.525t + 0.967) + 21.4$

$\approx 6.29\sin(0.525t + 0.967 - 2\pi) + 21.4$

$\approx 6.29\sin(0.525t - 5.32) + 21.4$

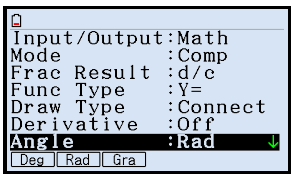
$\approx 6.29\sin(0.525(t - 10.1)) + 21.4\,.$

So, $a \approx 6.29$, $b \approx 0.525$, $c \approx 10.1$, and $d \approx 21.4\,.$

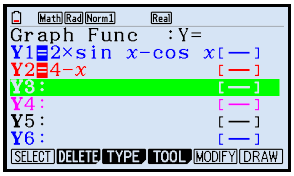
CHAPTER 17 - SOLVING TRIGONOMETRIC EQUATIONS

Casio fx-CG50

Select **Run-Matrix** from the Main Menu. Press SHIFT MENU (**SET UP**), scroll down to **Angle**, and press F2 (**Rad**) to change the Angle settings to radians.

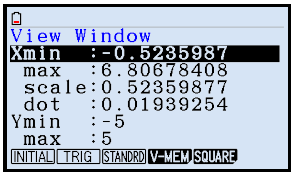


To solve the equation $2\sin x - \cos x = 4 - x$ for $0 \leqslant x \leqslant 2\pi$, select **Graph** from the Main Menu, then store $2\sin x - \cos x$ into **Y1** and $4 - x$ into **Y2**.

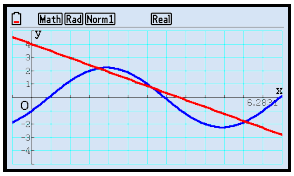


Press SHIFT F3 (**V-Window**), and set **Xmin** $= -\frac{\pi}{6}$, **Xmax** $= \frac{13\pi}{6}$, and **Xscale** $= \frac{\pi}{6}$.

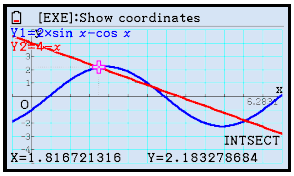
Note: π is entered by pressing SHIFT $\times 10^x$.



Press EXIT F6 (**DRAW**) to draw the graphs.



To find where the graphs intersect, press F5 (**G-SOLVE**), F5 (**INTSECT**). The first intersection point $(1.82, 2.18)$ is given. Press ▶ to find the remaining intersection points $(3.28, 0.725)$ and $(5.81, -1.81)$.



So the solutions to $2\sin x - \cos x = 4 - x$ are $x \approx 1.82, 3.28,$ and 5.81.