About this booklet…

Welcome to the world of **CASIO** scientific calculator. In this booklet, you will find some Mathematics problems of lower secondary till upper secondary level, which were carefully selected to demonstrate the use of the **CASIO** *fx*-570MS scientific calculator. The examples presented are among those commonly encountered while teaching and learning Mathematics in the lower and upper secondary in Malaysia.

You will probably know by now that the calculator is a tool that could speed up calculations efficiently and thus allows you to spend more time in understanding theory and logic of Mathematics.

It is important to remember that this booklet is not meant to replace the User's Guide that comes with your **CASIO** *fx*-570MS pack. Do read the User's Guide carefully before using this booklet.

We sincerely hope that you will enjoy working through the worked examples provided in this booklet. Having understood the usage of your **CASIO** *fx*-570MS scientific calculator, may it serve you more efficiently and effectively!

About the Author…

QED Education Scientific works to provide many wonderful resources and support to teachers & students using **CASIO** scientific calculator. With support from **Marco Corporation**, the sole distributor of **CASIO** range of calculators and the publisher of this booklet, we have been producing supplementary booklets, training manuals, training presentations and comprehensive professional development programme for in-service teachers using **CASIO** classroom technology for the past 3 years. The training arm of the consultancy was involved in the Curriculum Development Centre's *Graphics Calculator for Mathematics and Science* project in 2003.

About the Editor…

Nellie Gan Hong Suan obtained her Bachelor degree (Mathematics-Economics) from *Universiti Malaya* and her Master degree (Management Science) from *Universiti Utara Malaysia*. She has eighteen years of experience teaching Mathematics. She has also been involved in writing workbooks and reference books for secondary Mathematics. She is currently a Mathematics lecturer in *Maktab Perguruan Teknik*, Kuala Lumpur.

INTRODUCTION

Purpose of This Booklet...

This booklet is not intended to replace the *fx*-570MS User's Guide, nor any mathematics reference book. It is written with the aim that users of the powerful *fx*-570MS calculator, especially students, can acquire what we called "calculator skills". These skills will not be tested in any public examinations. However, we believe having developed these skills, students' interest in studying mathematics will be further enhanced. We believe they would have more fun exploring and investigating new mathematical ideas and concepts, and we wish to see in future students *enjoy* doing mathematics and tackling challenging mathematical problems.

This booklet is also to serve as an extension to our previous work on the equally interesting **CASIO** *fx*-350MS scientific calculator, *Exploring Mathematics with CASIO fx-350MS*.

Working With This Booklet...

The booklet is written with the assumption that the user has sufficient secondary mathematics training. As it is designed for Form 1 to Form 6 students, worked-examples in this booklet are selected problems from some topics in PMR's Mathematics, SPM's Mathematics and Additional Mathematics, and STPM Mathematics. ***Appendix 1*** is a list of *English ~ Bahasa Malaysia* mathematical terminologies used throughout the booklet.

We will be glad to entertain any feedbacks from the readers on this booklet. We love to hear from you at info@qed-edu.com

Support For the Reader...

To capture the essence of mathematics requires one to spend time in improving and reinforcing the fundamental principles by working through exercises provided in textbooks and reference books. May this booklet and the wonderful *fx*-570MS calculator help you in achieving this.

If you want to know more about this model, please visit these sites:

- CASIO Education site: www.casio.co.jp/edu_e
- Marco Corporation site: www.marco-groups.com

Other related resources on *fx*-570MS available are:

- *The Enjoyable Path to Math: A supplementary reader.*
- *Exploring Mathematics with CASIO fx-350MS.*

Or email to us at info@qed-edu.com.

TABLE OF CONTENTS

Let's Get St@rted!

There are two things you need to know before we start:

To activate any function in yellow, precede it by pressing the SHIFT *key*.
To activate any function in red, precede it by pressing the ALPHA *key*.

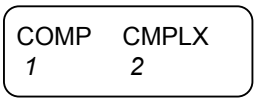
Now, let's try them out!

Example 1 Evaluate $\frac{1}{2}+\left(\frac{1}{\frac{1}{3}-\frac{1}{4}}\right)\div 3$, then express it as an improper fraction.

OPERATION

1. Choose COMP mode.

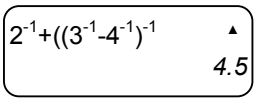
MODE 1



2. Key in the expression and evaluate.

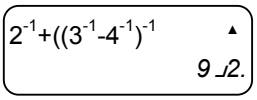
2 x^{-1} + ((3 x^{-1} −)

4 x^{-1}) x^{-1}) ÷ 3 =



3. Expressing the outcome as an improper fraction.

SHIFT $a^b/_c$



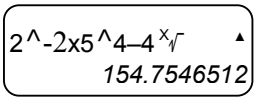
Example 2 Which is greater, (a) $2^{-2}\times 5^4-\sqrt[4]{5}$ or (b) $2^{-2}\times(5^4-\sqrt[4]{5})$?

OPERATION

1. While in COMP mode, press the following to evaluate $2^{-2}\times 5^4-\sqrt[4]{5}$.

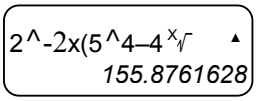
2 ^ (−) 2 X 5 ^ 4

− 4 SHIFT $\sqrt[x]{\ }$ ^ 5 =



2. To calculate $2^{-2}\times(5^4-\sqrt[4]{5})$, use the INS function to insert the bracket. Press ▷ numerous times until the cursor is below "5", then press

SHIFT INS DEL (=



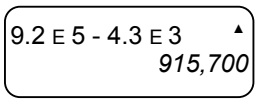
Obviously, (b) $2^{-2}\times(5^4-\sqrt[4]{5})$ is greater than (a) $2^{-2}\times 5^4-\sqrt[4]{5}$.

Example 3 Evaluate $9.2\times10^5 - 4.3\times10^3$.

OPERATION

1. Choose COMP mode, then evaluate $9.2\times10^5 - 4.3\times10^3$.

MODE 1 9 • 2 EXP 5 − 4 • 3 EXP 3 =



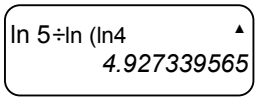
Therefore, $9.2\times10^5 - 4.3\times10^3$ is equal to 915 700.

Example 4 Find value of x which satisfies $(\ln 4)^x = 5$.

OPERATION

1. To solve this example for x we calculate $x = \dfrac{\ln 5}{\ln(\ln 4)}$, since $\ln(\ln 4)^x = \ln 5$

ln 5 ÷ ln (ln 4 =



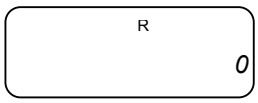
The solution is thus approximately 4.93.

Example 5 Convert 88.2° to its radian equivalent, correct to 4 d.p.s.

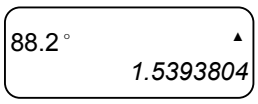
OPERATION

1. First enter Rad mode, then key in 88.2° to perform the conversion.

MODE MODE MODE MODE 2

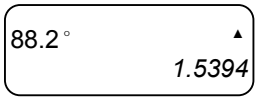


8 8 • 2 SHIFT DRG▸ Ans 1 =



2. Now to express the output correct to 4 d.p.s.

MODE MODE MODE MODE MODE 1 4



The above conversion shows that $88.2^\circ = 1.5394 rad$, correct to 4 d.p.s.

Tap MODE MODE MODE MODE MODE 3 1 to return to normal display.

►*Let's Get St@rted*

Example 6 Calculate $\tan(-22^\circ)$ and $\cos(3.1rad)$.

OPERATION

1. While you are in COMP/Deg (degree) mode, key in $\tan(-22^\circ)$.

tan (–) 2 2 =

```
tan -22
          -0.404026225
```

2. Now calculate $\cos(3.1rad)$.

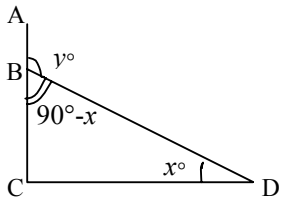
cos 3 • 1 SHIFT DRG▸ Ans 2 =

```
cos 3.1r
          -0.99913515
```

Hence, $\tan(-22^\circ)$ and $\cos(3.1rad)$ are approximately -0.4040 and -0.9991 respectively.

Example 7 ABC is a straight line. Given $\sin x = \frac{3}{7}$, find

a) $\angle x^\circ$, b) $\cos y$.



OPERATION

1. Make sure calculator is in COMP/Deg mode. Since $\sin x = \frac{3}{7}$, hence $x = \sin^{-1}\frac{3}{7}$

SHIFT sin⁻¹ sin 3 $a^b/_c$ 7 =

```
sin-1 3⌟7
          25.37693352
```

Hence we have $x = 25.37693352^\circ$.

2. Store this value of x into A.

SHIFT STO RCL A (–)

```
sin-1 3⌟7 → A
          25.37693352
```

3. Since $y = 90 + x$, calculate y and store it to B.

9 0 + STO RCL A (–) =

```
90+A
          115.3769335
```

SHIFT STO RCL B °’’’

```
90+A → B
          115.3769335
```

4. Now, calculate $\cos y$.

cos STO RCL B °’’’

```
cos B
          -0.428571428
```

Hence, $\cos y$ is approximately -0.429.

Example 8 Given that $2x^2 - y = 4$ and $x = 3$, find y.

OPERATION

1. While you are in COMP mode, enter the equation follow by the SOLVE function.

2 ALPHA) x^2 − ALPHA , ALPHA

CALC 4 SHIFT CALC

X? 0

2. Now the displayed screen requests for the value of x.

3 =

Y? 0

Press SHIFT CALC to solve for y.

Y? 14

Hence, $y = 14$.

Example 9

(a) A class of 30 students wants to have a class monitor, an assistant monitor & a treasurer. In how many ways can such a committee be formed?

(b) A group of 4 students is to be chosen from a class of 28 for a debate team. In how many ways can such a group be formed?

OPERATION

1. This is essentially the permutation of 30 objects taken 3 at a time.

3 0 SHIFT X 3 =

30P3 24360

Hence, there are 24 360 ways to form the class committee.

2. While (b) is the combinations of 28 objects taken 4 at any time.

2 8 SHIFT ÷ 4 =

28C4 20475

This means that the number of combinations is 20 475.

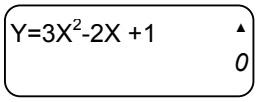
Example 10 Given that $y = 3x^2 - 2x + 1$ where $-2 \le x \le 2$, $x \in Z$. Find the corresponding values of y and construct a table of values.

OPERATION

1. Press the following to key in the function.

ALPHA (Y) , ALPHA (=) CALC 3 ALPHA (X)) x^2

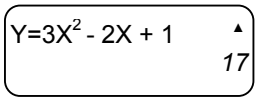
– 2 ALPHA (X)) + 1



2. Input the first x value, $x = -2$.

CALC

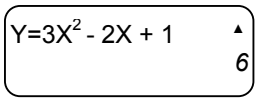
(–) 2 =



This means $y = 17$ when $x = -2$.

3. Input the next x value, $x = -1$.

CALC (–) 1 =



This means $y = 6$ when $x = -1$.

4. Continue replacing $x = 0, 1, 2$, and values obtained for y are 1, 2, 9 respectively.

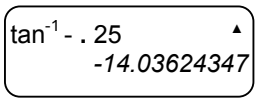
x	-2	-1	0	1	2
y	17	6	1	2	9

Example 11 Given that $\tan x = -0.25$, where $270 \le x \le 360^\circ$. Find value of x that satisfies the equation.

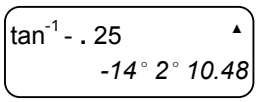
OPERATION

1. Choose COMP mode. To find the basic acute angle α, we use $\alpha = \tan^{-1} 0.25$,

SHIFT tan^{-1} (–) • 2 5 =



°’’’



2. Since x lies in the fourth quadrant.

3 6 0 + Ans = °’’’

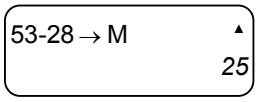
Hence, x is approximately $345^\circ 58'$.

Example 12 Calculate $(53-28)+4[73-(21\times 5)]-2(44+7)$.

OPERATION

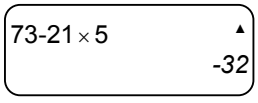
1. While in COMP mode, key in the expression for calculation. Then store the output to M.

5 3 – 2 8 SHIFT RCL(STO) M+

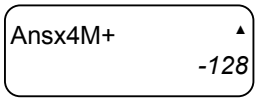


2. Calculate the other expressions and use the function M+ to store the output.

7 3 – 2 1 X 5 =

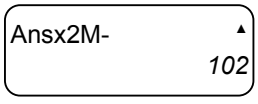


X 4 M+

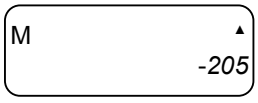


4 4 + 7 =

X 2 SHIFT M+(M-)



ALPHA M+(M) =



Hence, $(53-28)+4[73-(21\times 5)]-2(44+7)=-205$.

Simultaneous Linear Equations

Example 1 Solve the following linear equations simultaneously.

$$0.5x + 3.7y = 2$$
$$3x - 11y = -3$$

OPERATION

1. Press the MODE key until you see the screen at right.

MODE MODE MODE

```
EQN   MAT   VCT
 1     2     3
```

Select EQN by tapping [1] once.

```
Unknowns?
  2  3
```

As this is a problem of 2 unknowns, we choose 2.

[2]

```
a1?
                0
```

2. Now key in the coefficients and constant of the first equation.

[0] [•] [5] [=]

```
b1?
                0
```

[3] [•] [7] [=]

```
c1?
                0
```

[2] [=]

```
a2?
                0
```

3. And the coefficients and constant of the second equation.

[3] [=]

```
b2?
                0
```

[(–)] [1] [1] [=]

```
c2?
                0
```

[(–)] [3] [=]

```
x=
        0.656626506
```

Press ▽ to view the solution for y.

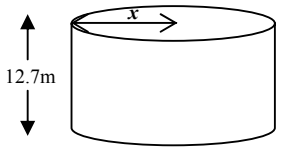
```
y=
        0.451807228
```

Hence the solution is $x = 0.657$, $y = 0.452$, correct to 3 d.p.s.

Surface Area and Volume of Solid

Example 1

A closed cylindrical water tank is such that the height of the tank is 12.7m and its radius varies between 15m and 39.6m inclusive. Find the amount of material needed to produce this tank when its radius is
(i) maximum, (ii) twice its height.



OPERATION

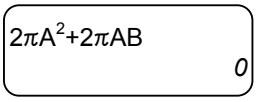
1. First enter COMP mode.

MODE 1

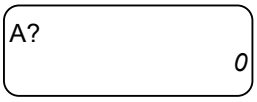
2. Calculate the tank surface area using the cylindrical formula, $2\pi r^2 + 2\pi rh$. We shall let A, B represent r, h respectively, and use the CALC function.

2 SHIFT π EXP ALPHA A (–) x^2 +

2 SHIFT π EXP ALPHA A (–) ALPHA B °’’’



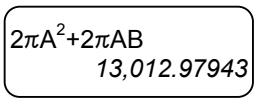
Followed by CALC



3. Input the values A=39.6 and B=12.7 to calculate part (i).

3 9 • 6 =

1 2 • 7 =

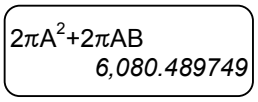


Therefore, the amount of material needed when radius is maximum, or when A=39.6, is approximately 13012.98m^2.

4. To calculate part (ii), press CALC immediately after and input A=2×12.7 and B=12.7.

2 X 1 2 • 7 =

1 2 • 7 =



Hence approximately 6080.49m^2 of material is needed when the tank's radius is twice its height.

Statistic I

Example 1

Below are weights distribution of 20 students in a class.

30	39	34	37	39	31	32	33	32	30
32	35	38	41	35	35	37	39	35	39

Find the mean of the distribution.

OPERATION

1. Enter SD (standard deviation) mode.

MODE MODE 1

SD D
0

2. Now key in all data.

3 0 M+

n= SD D
1

3 9 M+

n= SD D
2

3 2 M+

n= SD D
3

▪

▪ (continue keying in the rest of the data)

▪

3 9 M+

n= SD D
20

3. To obtain the mean, press

SHIFT 2 1 =

$\bar{x}$
35.15

Therefore we have obtained the mean of the distribution as 35.15.

►*Statistic I*

Example 2

Table below shows the quantity of drinks (in litre) bought by 70 students during a sport event.

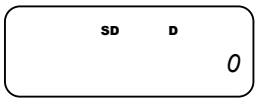
In litre	1	2	3	4	5	6
No of Students	9	14	22	12	9	4

Find the mean & the standard deviation of quantity of drinks bought.

OPERATION

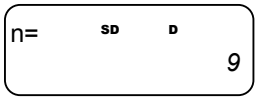
1. First enter SD (standard deviation) mode.

MODE MODE 1

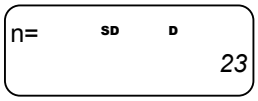


2. Then key in all data.

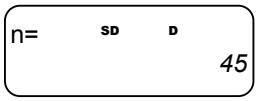
1 SHIFT ; 9 M+



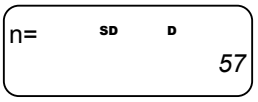
2 SHIFT ; 1 4 M+



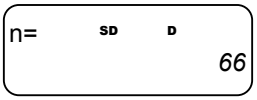
3 SHIFT ; 2 2 M+



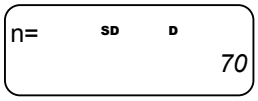
4 SHIFT ; 1 2 M+



5 SHIFT ; 9 M+

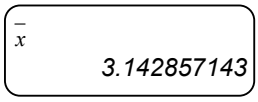


6 SHIFT ; 4 M+



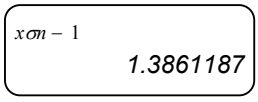
3. So the mean is

SHIFT 2 1 =



4. And the standard deviation is

SHIFT 2 3 =



Therefore, the mean and standard deviation of drinks bought by the 70 students are approximately 3.14 & 1.39 respectively.

Number Systems

Example 1

(a) Express 22_8 in decimal (base 10).

(b) Calculate 28_{10} X $111_2 + 35_{10}$. Leave your answer in binary.

OPERATION

1. First enter BASE mode. (Your display screen maybe different.)

MODE MODE 3

```
                    0 b
```

2. Now key in 22_8.

OCT ln 2 2 =

```
22
                   22 o
```

3. Convert 22_8 into its base 10 equivalent.

DEC x^2

```
22
                   18 d
```

Therefore 22_8, which is in octal (base 8), is equivalent to 18_{10}.

4. Now to calculate (b) 28_{10} X $111_2 + 35_{10}$.

DEC x^2 2 8 X LOGIC x^{-1} LOGIC x^{-1} LOGIC x^{-1}

```
d   h   b   o
1   2   3   4
```

3

```
28Xb
                    0 d
```

1 1 1 + LOGIC x^{-1} LOGIC x^{-1} LOGIC x^{-1}

1

```
28Xb111+d
                    0 d
```

3 5 =

```
28Xb111+d35
                  231 d
```

BIN log

```
28Xb111+d35
             11100111 b
```

Hence, 28_{10} X $111_2 + 35_{10}$ is equivalent to 11100111_2.

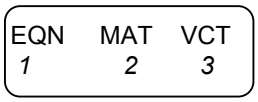
Quadratic and Cubic Equations

Example 1 Show that one root of $16x^2 - 104x + 126.75 = 0$ is triple the other.

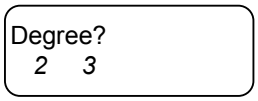
OPERATION

1. First enter EQN mode.

MODE MODE MODE 1



Press ▷ once to enter the equation screen.



As we are solving a quadratic equation, we would specify the degree as 2.

2

2. Now key in the values of a, b and c in the equation $ax^2 + bx + c = 0$.

1 6 =

(–) 1 0 4 =

1 2 6 • 7 5 =

3. One of the roots is displayed on the screen.

Press ▽ to view the other root.

Obviously the root 4.875 is triple the other root, 1.625, as 4.875 = 3 x 1.625.

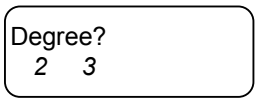
►*Quadratic and Cubic Equations*

Example 2 Solve the cubic equation of $x^3 - 9x^2 + 19x + 29 = 0$ for x.

OPERATION

1. First enter EQN mode, then enter the equation screen.

MODE MODE MODE 1 ▷



As we are solving a cubic equation, specify the degree as 3.

3

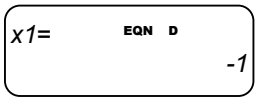
2. Input the values of a, b, c and d for the equation $ax^3 + bx^2 + cx + d = 0$.

1 = (–) 9 =

1 9 =

2 9 =

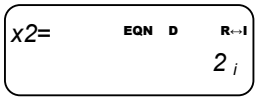
3. The first solution is displayed.



Press ▽ to view other solutions.

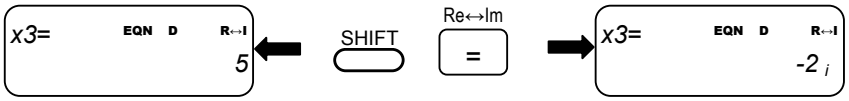
The symbol R↔I at the upper right means that the solution displayed is a complex number, and its real part is 5.
To display its imaginary part, press

SHIFT Re↔Im =



Each press of **SHIFT Re↔Im** toggles the display between the real part and imaginary part.

4. Tap ▽ to view the final solution, which is also a complex number.



Therefore the solutions to $x^3 - 9x^2 + 19x + 29 = 0$ are $x = -1$, $x = 5 + 2i$ and $x = 5 - 2i$, where the two complex solution are conjugates of each other.

Differential: A Numerical Approach

Example 1 Show that 2 of the stationary points of $f(x) = x^3 - 4x^2 - 11x + 30$ are at $x = -1$ and $x = 11/3$.

OPERATION

1. While in COMP more, press

SHIFT d/dx (∫ dx)

d/dx(
0

2. Key in the function and evaluate $f'(-1)$.

ALPHA X) SHIFT x^3 (x^2) − 4 ALPHA X) x^2 − 1 1 ALPHA X)

\+ 3 0 , (−) 1 =

d/dx(X³-4X²-11X+30,
0

As $f'(-1) = 0$, one of $f(x) = x^3 - 4x^2 - 11x + 30$ stationary points lies on $x = -1$.

3. Now to evaluate $f'(\frac{11}{3})$, tap on ◁ a few times until the cursor is below the minus sign.

◁ ◁ ◁

X³-4X²-11X+30,-1_
0

4. Replace -1 with $11/3$.

1 1 $a^b/_c$ 3

X³-4X²-11X+30,11 ⌟3
0

Let the change in x, Δx as 0.0001. This would improve the numerical method's accuracy.

, 0 • 0 0 0 1

=

d/dx(X³-4X²-11X+30,
0

As with before, since $f'(\frac{11}{3}) = 0$, therefore a stationary point of $f(x) = x^3 - 4x^2 - 11x + 30$ lies on $x = 11/3$.

Definite Integral: Area of Region

Example 1

Determine the area of the region bounded by $y = 2\sin x$, the x-axis, $x = 0$ and $x = \frac{7\pi}{4}$.

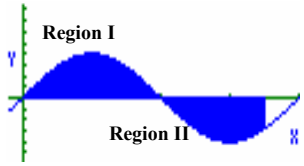


Figure 1

For this example we divide the region into **Region I** and **Region II** as illustrated in Figure 1.

OPERATION

1. Enter COMP mode and switch to Rad (radian), as the definite integral involves upper and lower bounds in radian.

MODE 1

MODE MODE MODE MODE 2

R
0

2. Calculate the area of **Region I** and store the answer to A. The calculation may take a few seconds.

∫dx

∫(
0

2 sin ALPHA X) , 0

, SHIFT π EXP SHIFT STO RCL A (–)

∫(2sin X,0,π→A
4

3. Now calculate the area of **Region II** and store the answer to B.

0 – ∫dx

0 - ∫(
0

,

2 sin ALPHA X) , SHIFT π EXP

, 7 SHIFT π EXP $a^b/_c$ 4 SHIFT

STO RCL B °,,,

0 - ∫(2sin X,π,7π⌟4
3.41421

4. The area of the region is equivalent to the sum of values stored in A and B.

ALPHA A (–) + ALPHA B °,,,

A+B
7.41421

Therefore the area of this region is 7.41421 unit^2.

Statistic II

Example 1 Find the following standardised normal distribution.
(a) P(Z > 0.825), (b) P(Z ≤ 1.054), (c) P(-1.2 ≤ Z ≤ 0.3).

OPERATION

1. Enter SD (standard deviation) mode.

MODE MODE 1

```
SD    D
              0
```

2. First find P(Z > 0.825).

SHIFT 3

```
P(   Q(   R(   → t
1    2    3    4
```

3

```
R(
              0
```

0 • 8 2 5 =

```
R(0.825
          0.20469
```

Hence P(Z > 0.825) is approximately 0.205.

3. Next, find P(Z ≤ 1.054).

SHIFT 3 1

```
P(
              0
```

1 • 0 5 4 =

```
P(1.054
          0.85406
```

Hence P(Z ≤ 1.054) is approximately 0.854.

4. Now to obtain P(-1.2 ≤ Z ≤ 0.3).

SHIFT 3 1 0 • 3 =

```
P(0.3
          0.61791
```

–

```
Ans -
          0.61791
```

SHIFT 3 1 (–) 1 • 2

=

```
Ans –P(-1.2
          0.50284
```

Therefore P (-1.2 ≤ Z ≤ 0.3) is approximately 0.503.

Matrices: 2×2 and 3×3

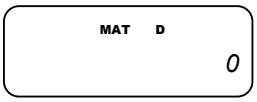
Example 1 Given $A = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$ & $B = \begin{bmatrix} 3 & 2 \\ 2 & -1 \end{bmatrix}$, find

(i) A x 2B (ii) A^{-1} (iii) A^4

OPERATION

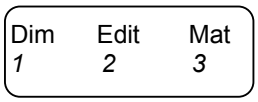
1. Enter MAT (Matrix) mode.

MODE MODE MODE 2

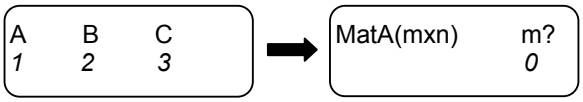


2. Specify the dimension of the matrix A.

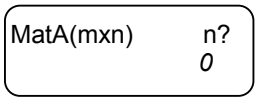
SHIFT 4



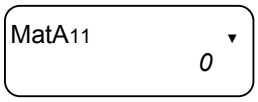
1 1



2 =

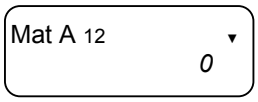


2 =

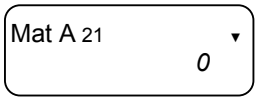


3. Now key in all 4 entries.

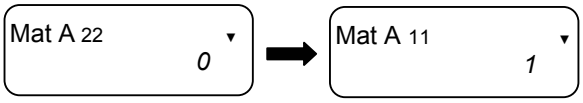
1 =



(–) 1 =



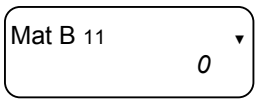
0 = 2 =



4. Similarly, specify the dimension of matrix B and then define the entries of B.

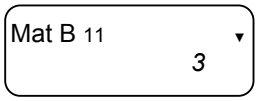
SHIFT 4 1 2 2 =

2 =



3 = 2 = 2 = (–)

1 =



►*Matrices:2x2 and 3x3*

6. Calculate (i) A x 2B.

SHIFT 4 3 1

MatA
0

X 2 SHIFT 4 3 2 =

MatAns11
2

Use ◁ △ ▽ ▷ to view all entries.

MatAns12
6

⟷

MatAns21
8

⟷

MatAns22
-4

Hence, we have A x 2B = $\begin{bmatrix} 2 & 6 \\ 8 & -4 \end{bmatrix}$.

7. Now find (ii) A^{-1}.

SHIFT 4 3 1 x^{-1} =

MatAns11
1

Similarly, use ◁ △ ▽ ▷ to view all entries.

MatAns12
0.5

⟷

MatAns21
0

⟷

MatAns22
0.5

Therefore, the inverse of A, $A^{-1} = \begin{bmatrix} 1 & 0.5 \\ 0 & 0.5 \end{bmatrix}$.

8. Lastly, calculate (iii) A^4 using A^2 x A^2.

SHIFT 4 3 1 x^2 X SHIFT

4 3 1 x^2 =

MatAns11
1

▷

MatAns12
-15

▷

MatAns21
0

▷

MatAns22
16

Hence, $A^4 = \begin{bmatrix} 1 & -15 \\ 0 & 16 \end{bmatrix}$.

►*Matrices:2x2 and 3x3*

Example 2 Given $C = \begin{bmatrix} 2 & -1 & 0 \\ 1 & -2 & 0 \\ 0 & 1 & 3 \end{bmatrix}$ & $D = \begin{bmatrix} 1 & -2 & 0 \\ 0 & 2 & 1 \\ 3 & 0 & 1 \end{bmatrix}$, find determinant of C x D^T.

OPERATION

1. While in MAT mode, specify the dimension of the 3x3 matrix C.

SHIFT 4 1 1 3 = 3

=

Mat A 11
0

2. Key in all entries of matrix C.

2 = (–) 1 = 0 =

. . . 3 =

Mat A 11
2

3. Similarly, specify the dimension of matrix D and key in its entries.

SHIFT 4 1 2 3 = 3

= 1 = . . . 1 =

Mat B 11
1

4. First we calculate C × D^T.

SHIFT 4 3 1 X SHIFT 4

▷ 2 SHIFT 4 3 2 =

MatAns12
-2

Use ◁ △ ▽ ▷ to view all entries.

MatAns32
5

Hence, C x $D^T = \begin{bmatrix} 3 & 0 & 9 \\ -6 & 6 & 0 \\ -1 & 11 & 12 \end{bmatrix}$.

5. Now to find determinant of C × D^T.

SHIFT 4 ▷ 1 SHIFT 4 3

4 =

Det MatAns
36

So the determinant of C × D^T is 36.

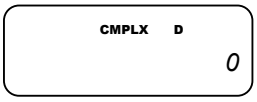
Complex Numbers

Example 1 Given that $z_1 = 1 - 3i$ and $z_2 = 2 + 7i$, express $z_1 + z_2$ in polar form.

OPERATION

1. First enter CMPLX/Deg mode.

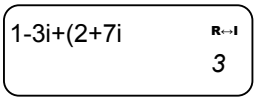
MODE 2



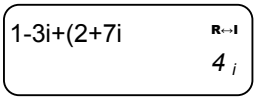
2. Now calculate $z_1 + z_2$.

1 − 3 ENG(i) + (2

+ 7 ENG(i) =



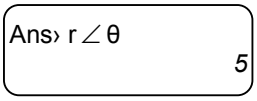
SHIFT Re↔Im(=)



Press SHIFT Re↔Im(=) to toggle display between the real part and imaginary part.

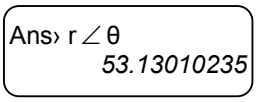
3. Expressing $z_1 + z_2$ in polar form.

SHIFT ►r∠θ(+) =



Here the modulus of $z_1 + z_2$ is 5.

SHIFT =



And the argument is approximately 53.13°

Therefore the complex number $z_1 + z_2$ in polar form is $5\angle 53.13°$

Appendix 1

English ~ Bahasa Malaysia Mathematical Terms

English	***Bahasa Malaysia***
Acute angle	*Sudut tirus*
Area	*Luas*
Bound	*Sempadan*
Coefficient	*Pekali*
Combinations	*Gabungan*
Constant	*Pemalar*
Cubic	*Kubik*
Decimal	*Perpuluhan*
Definite Integral	*Kamiran Tentu*
Determinant	*Penentu*
Differential	*Pembezaan*
Distribution	*Taburan*
Equation	*Persamaan*
Expression	*Ungkapan*
Fraction	*Pecahan*
Improper fraction	*Pecahan tak wajar*
Inverse	*Songsangan*
Mean	*Min*
Numerical	*Berangka*
Octal	*Perlapanan*
Permutations	*Pilihatur*
Power	*Kuasa, eksponen*
Probability	*Kebarangkalian*
Quadrant	*Sukuan*
Radius	*Jejari*
Region	*Rantau*
Roots	*Punca-punca*
Simultaneous equations	*Persamaan serentak*
Solution	*Penyelesaian*
Standard deviation	*Sisihan piawai*
Stationary point	*Titik pegun*
Unknown	*Anu*
Variable	*Pembolehubah*