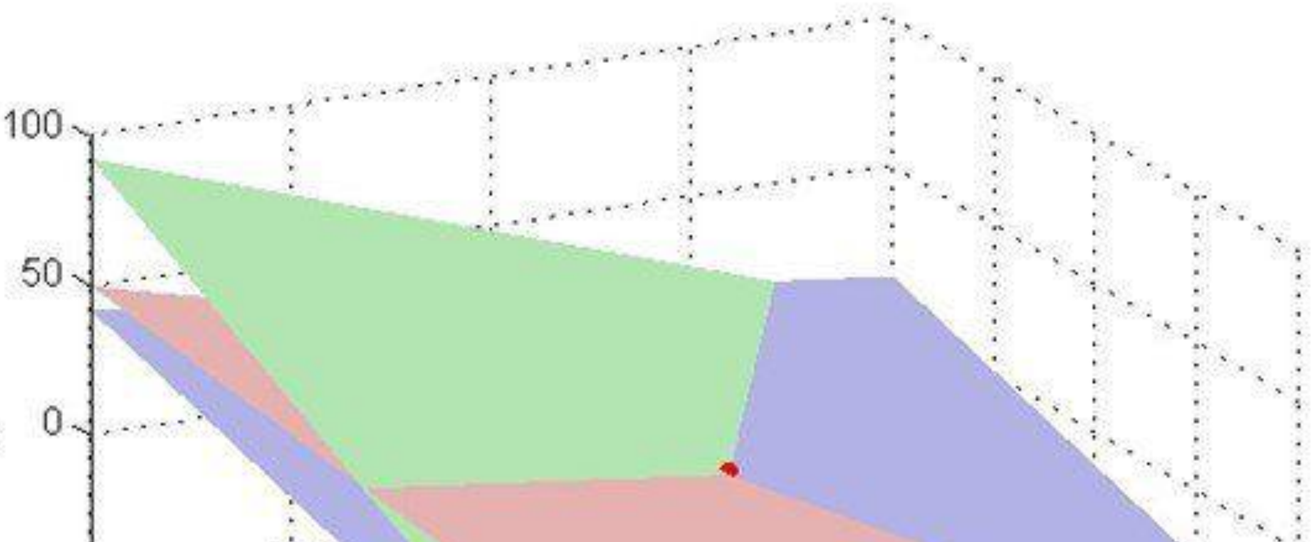
SKOR A+ MATEMATIK TAMBAHAN

31st August 2021

Tuesday | 8.00 pm – 10.00pm

Systems of Equations



Anjuran Unit Matematik
Bahagian Pendidikan Menengah MARA

https://bit.ly/CgKibSoEquations

KHAIRULBARIAH BINTI KHAIRUDDIN

MRSM MERSING, JOHOR.

CHAPTER 3

SYSTEMS OF EQUATIONS

Prior knowledge : linear Equations (Form 1)

6.3 Simultaneous Linear Equations in Two Variables

- involves **TWO** variables
- solving the simultaneous equations using the method of **SUBSTITUTION** or **ELIMINATION**

https://anyflip.com/fznx/sdlu

Prior knowledge : linear Equations (Form 1)

Solve the following simultaneous equations by using **substitution** method.

$$x - 3y = 7$$

$$5x + 2y = 1$$

Answer :

$x - 3y = 7$ —— **1**

$5x + 2y = 1$ —— **2**

Express x in terms of y

From **1**, $x = 7 + 3y$ —— **3**

Substitute **3** in **2**.

Substitute x with $7 + 3y$

$5(7 + 3y) + 2y = 1$

$35 + 15y + 2y = 1$

$17y = -34$

$y = -2$

Substitute $y = -2$ in **3**

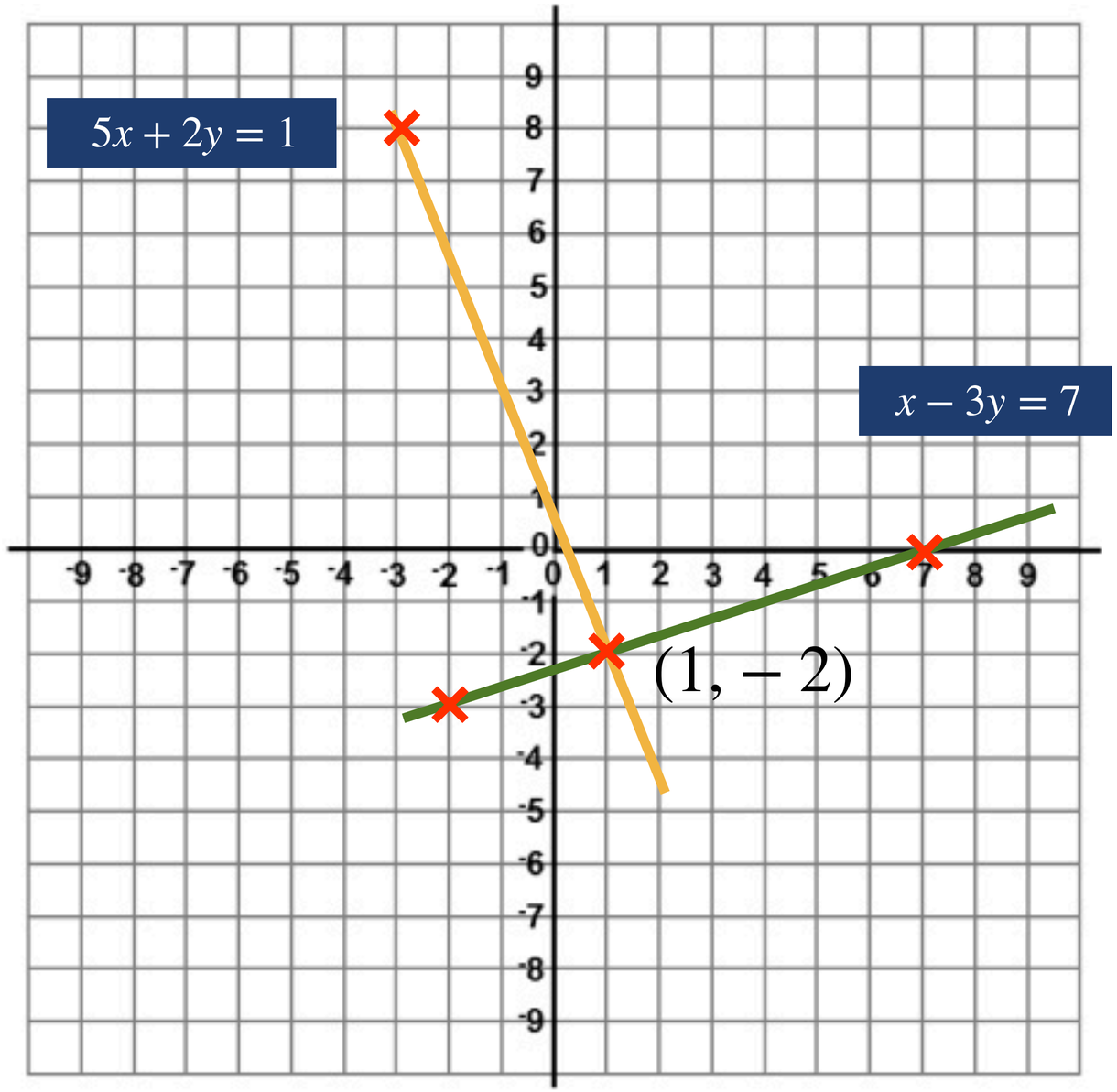
$x = 7 + 3(-2)$

$x = 1$

Prior knowledge : linear Equations (Form 1)

Solution by using graphical representation.

$5x + 2y = 1$		
x	-3	1
y	8	-2



$x - 3y = 7$		
x	7	-2
y	0	-3

Prior knowledge : linear Equations (Form 1)

Solve the following simultaneous equations by using **elimination** method.

$$4x + 3y = 8$$

$$x - 3y = 2$$

Answer :

Identify the variable with the same coefficient

$4x + 3y = 8$ —— 1

$x - 3y = 2$ —— 2

We use + since one of the coefficient is + and the other is −

Eliminate y by **1 + 2**

1 + 2 : $5x + 0 = 10$

$5x = 10$

We shall use − if both coefficient is + or −

$x = 2$

Substitute $x = 2$ in **1** :

$4(2) + 3y = 8$

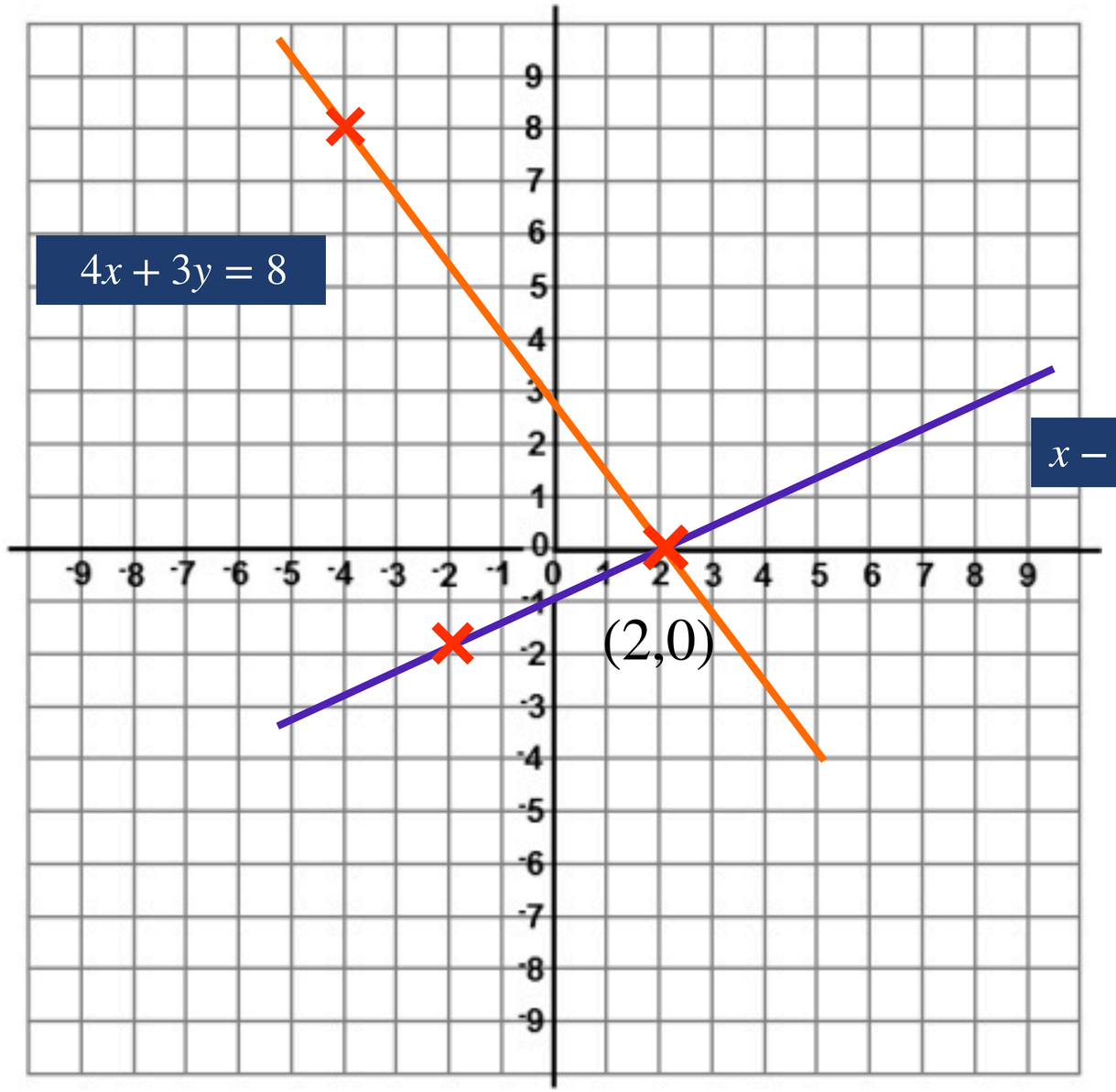
$3y = 0$

$y = 0$

Prior knowledge : linear Equations (Form 1)

Solution by using graphical representation.

$4x + 3y = 8$		
x	2	-4
y	0	8



$x - 3y = 2$		
x	-2	2
y	-2	0

SYSTEMS OF EQUATIONS

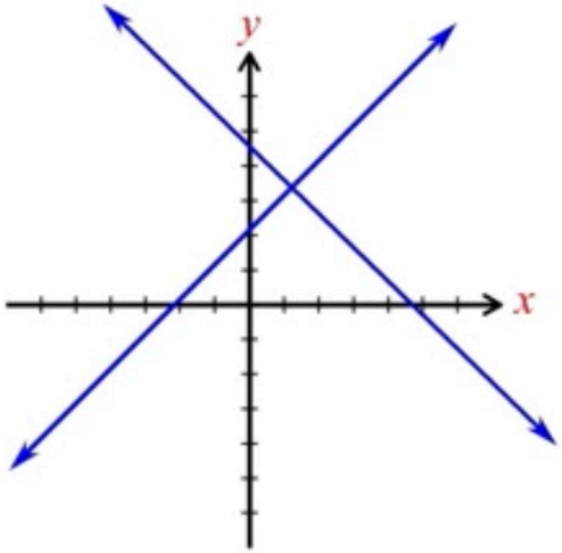
- 3.1 System of linear equations in three variables.
- 3.2 Simultaneous equations involving one linear equation and one non-linear equation.

3.1 System of linear equations in three variables.

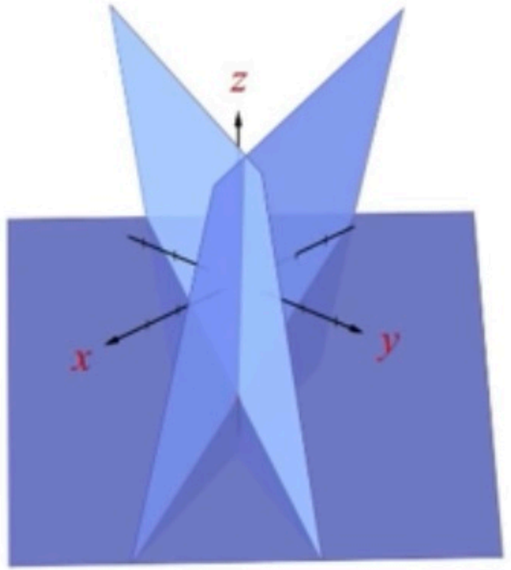
Involves LINEAR EQUATIONS $ax + by + cz = d$

where a, b, c **&** d **are constants.**

2 variables

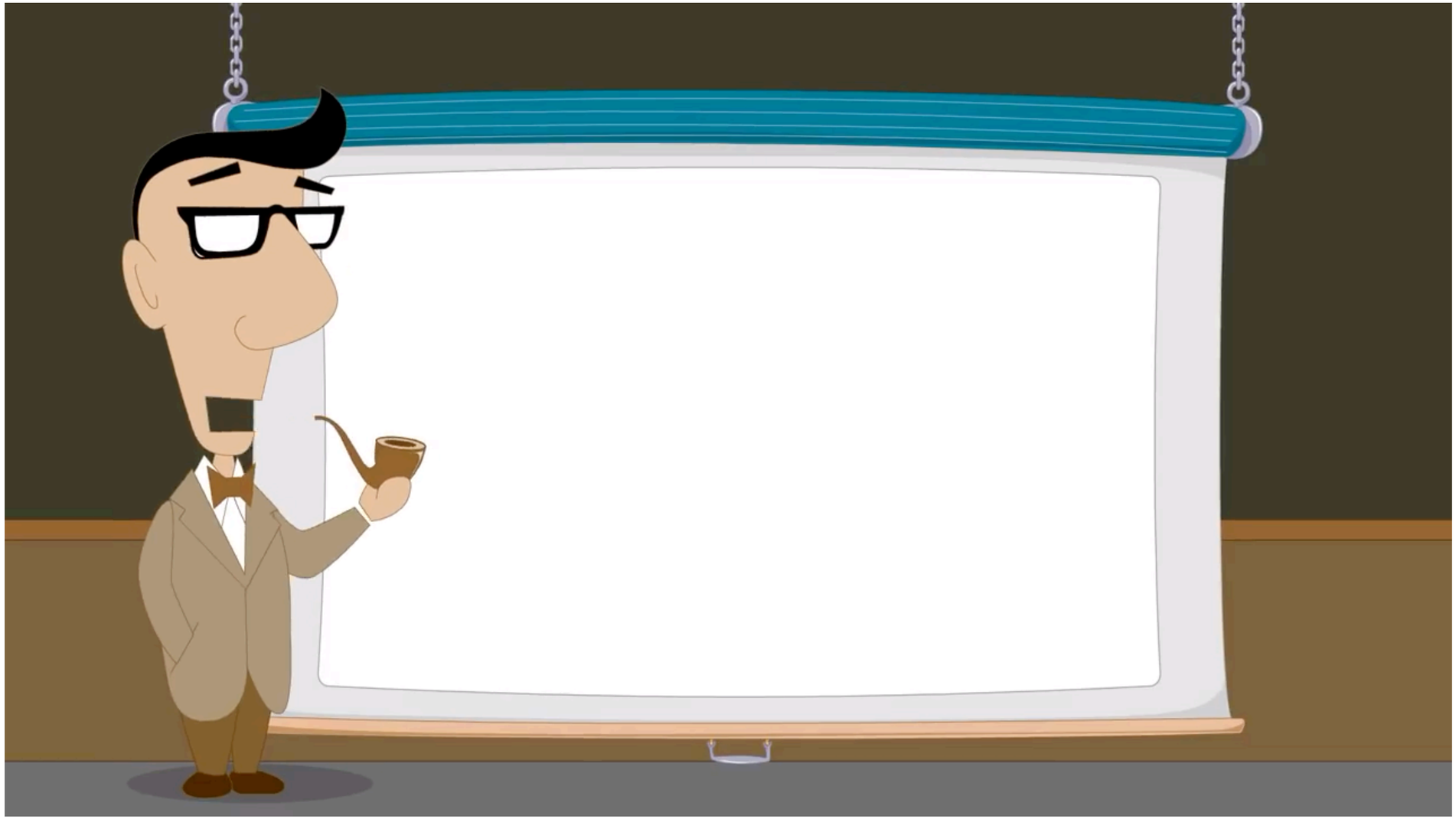


3 variables



3.1 System of linear equations in three variables.

Systems of equation in TWO and THREE VARIABLES

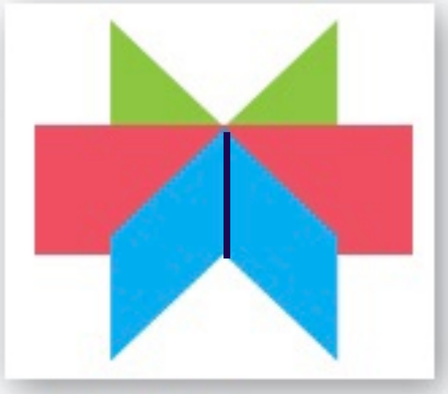


Youtube : MyWhyU

3.1 System of linear equations in three variables.

Solutions to Systems of Linear Equations in Three Variables

only one solution

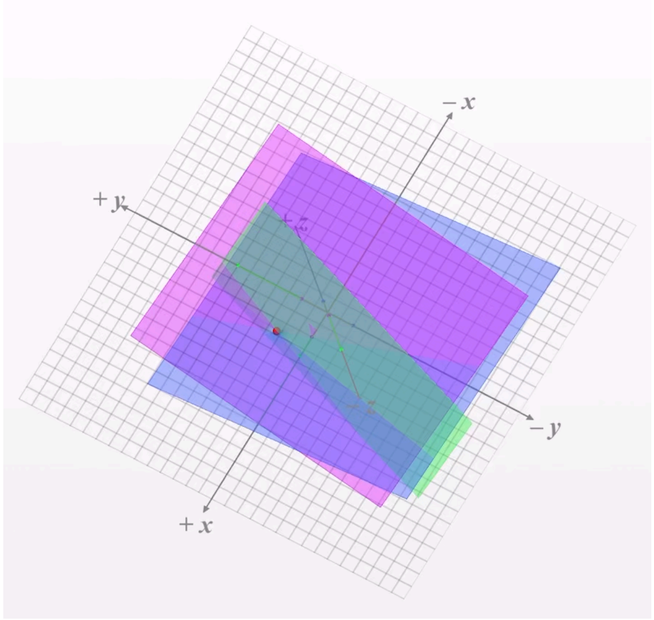


Infinitely many solutions

No solution

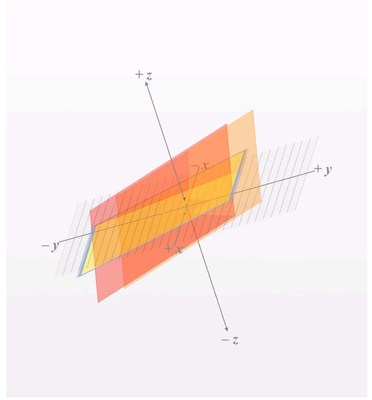
3.1 System of linear equations in three variables.

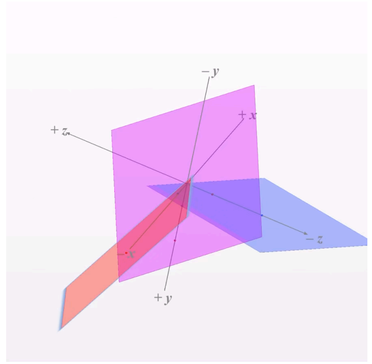
Solutions to Systems of Linear Equations in Three Variables



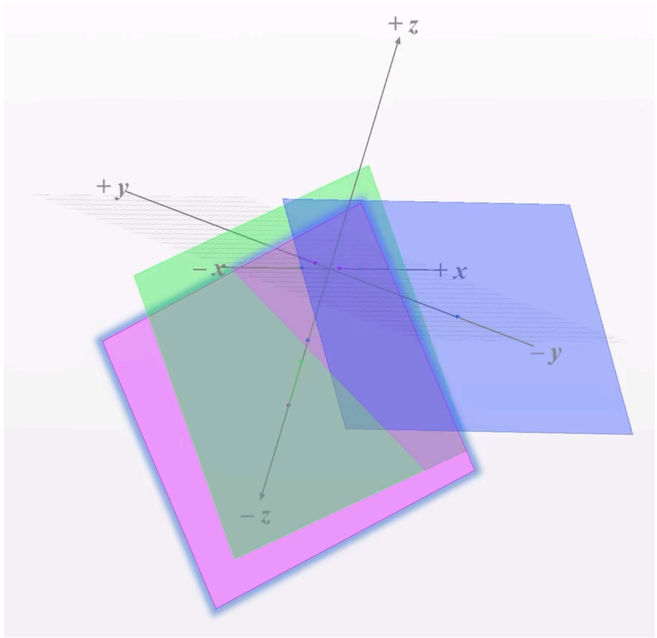
One Solution

(x, y, z)





No solution



Infinite solution

cpm 3D Plotter

3.1 System of linear equations in three variables.

Methods to find the solution the Systems of Linear Equations in Three Variables

3.1 System of linear equations in three variables.

Example 1

Solve the following simultaneous equations using **substitution** method :

$$2x + y - z = 7$$

$$x - y + z = 2$$

$$x + y - 3z = 2$$

3.1 System of linear equations in three variables.

Solution 1

$2x + y - z = 7$ —— **1**

$x - y + z = 2$ —— **2**

$x + y - 3z = 2$ —— **3**

Label all equations

From **1**, $y = 7 - 2x + z$ —— **4**

express y in terms of x and z

Substitute 4 in 2,

$x - (7 - 2x + z) + z = 2$

$3x = 9$

$x = 3$

Substitute 4 in 3,

$x + (7 - 2x + z) - 3z = 2$

$-x - 2z = -5$

$-3 - 2z = -5$

$z = 1$

Substitute $x = 3$

Substitute $x = 3$ and $z = 1$ in 4 to get y

$y = 7 - 2(3) + 1$

$y = 2$

$x = 3$, $y = 2$, $z = 1$

3.1 System of linear equations in three variables.

Example 2

Solve the following simultaneous equations using **elimination** method :

$$2x + y - z = 7$$

$$x - y + z = 2$$

$$x + y - 3z = 2$$

3.1 System of linear equations in three variables.

Solution 2

$$2x + y - z = 7 \text{ —— } 1$$

$$x - y + z = 2 \text{ —— } 2$$

$$x + y - 3z = 2 \text{ —— } 3$$

Identify the variable with the same coefficient

Eliminates y and z by 1 + 2,

$$2x + x + y + (-y) - z + z = 7 + 2$$

$$3x = 9$$

$$x = 3$$

Substitute $x = 3$ in 2 and 3

$$3 - y + z = 2$$

$$-y + z = -1 \text{ —— } 4$$

Label new equations as 4 and 5

$$3 + y - 3z = 2$$

$$y - 3z = -1 \text{ —— } 5$$

Eliminates y by 4 + 5,

$$-y + y + z + (-3z) = -1 + (-1)$$

$$-2z = -2$$

$$z = 1$$

Substitute $x = 3$ and $z = 1$ in 1

$$2(3) + y - 1 = 7$$

$$y = 2$$

3.1 System of linear equations in three variables.

Solution 2 (Alternative)

$2x + y - z = 7$ —— **1**

$x - y + z = 2$ —— **2**

$x + y - 3z = 2$ —— **3**

Identify the variable with the same coefficient

Eliminates y and z by 1 + 2,

$$2x + x + y + (-y) - z + z = 7 + 2$$

$$3x = 9$$

$x = 3$

Eliminates y by 2 + 3

$$2x - 2z = 4$$

$$2(3) - 2z = 4$$

$$-2z = -2$$

$z = 1$

Substitute $x = 3$ and $z = 1$ in 1

$$2(3) + y - 1 = 7$$

$y = 2$

3.1 System of linear equations in three variables.

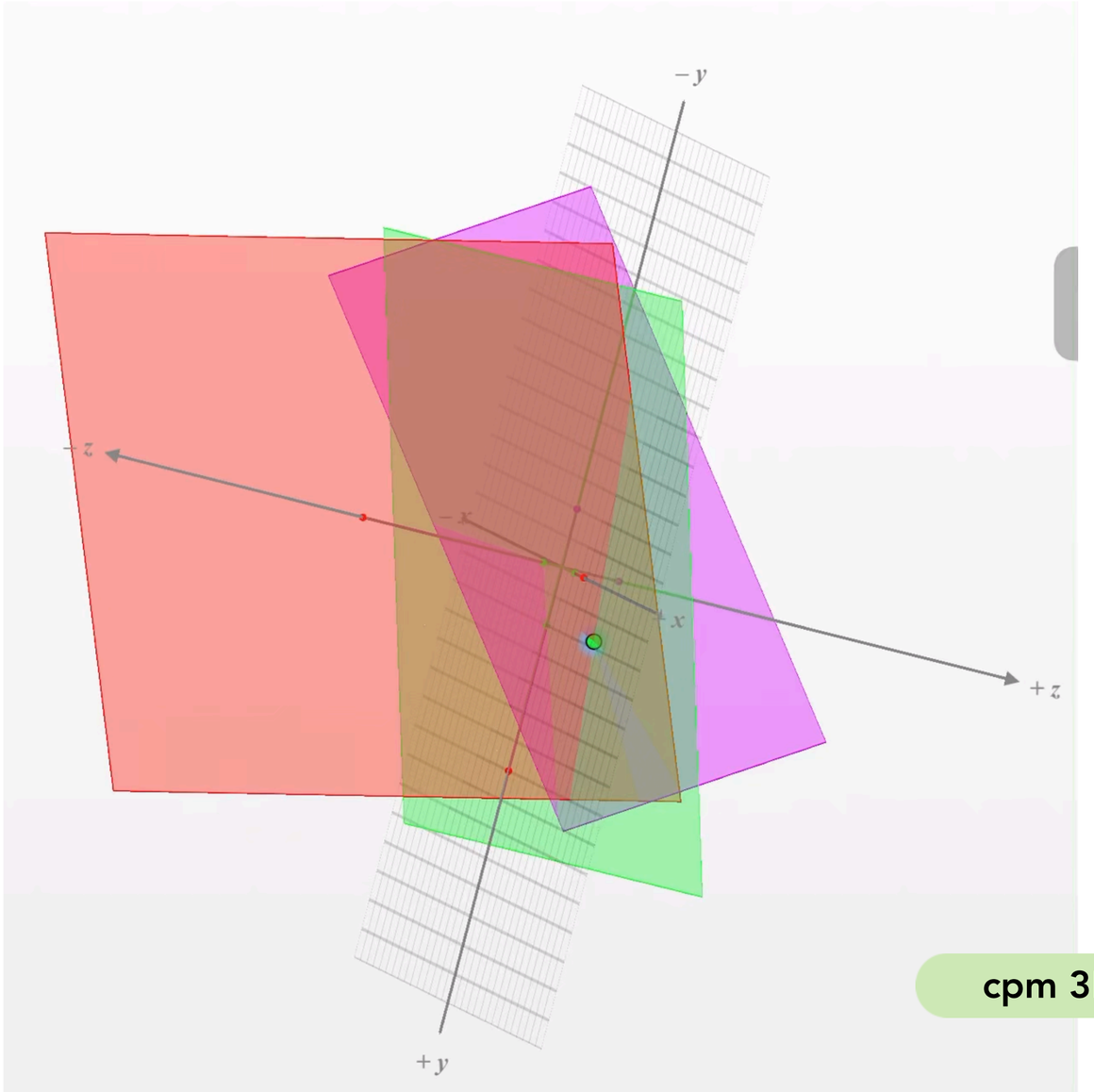
Solution by using graphical representation.

$$2x + y - z = 7$$

$$x - y + z = 2$$

$$x + y - 3z = 2$$

Answer : $(3,2,1)$



cpm 3D Plotter

3.1 System of linear equations in three variables.

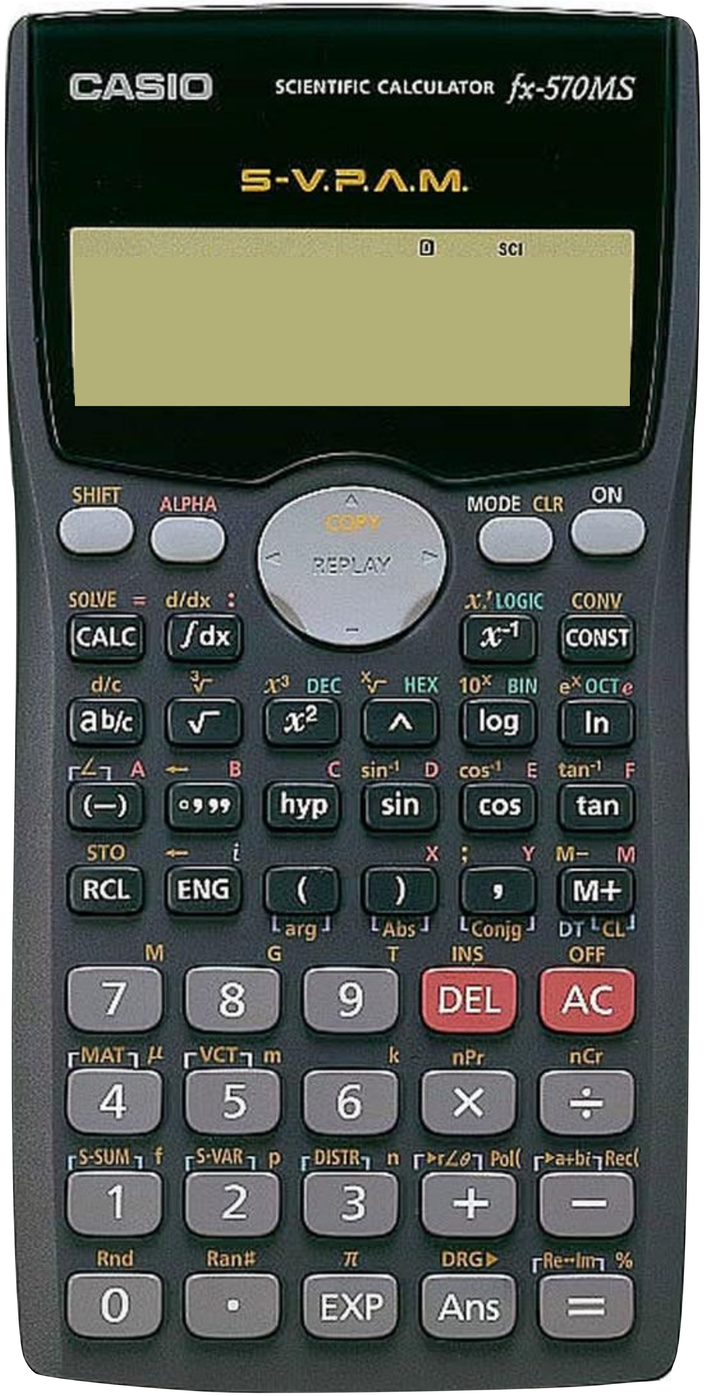
Verify your answers using calculator :

$$2x + y - z = 7$$

$$x - y + z = 2$$

$$x + y - 3z = 2$$

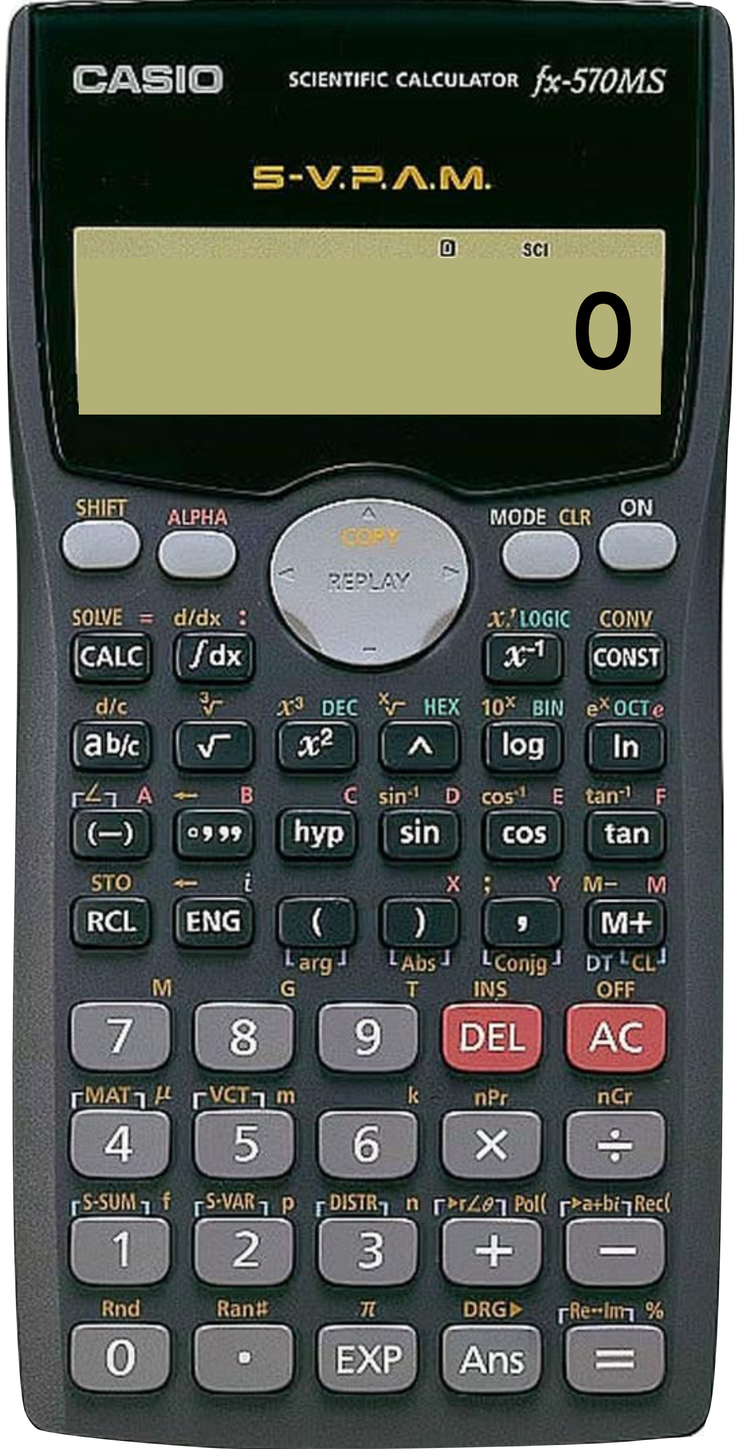
- Key in the values in order of the unknowns.
- Always push the button "=" after each value is entered.
- The answers are given in the order of x , y and z.



3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

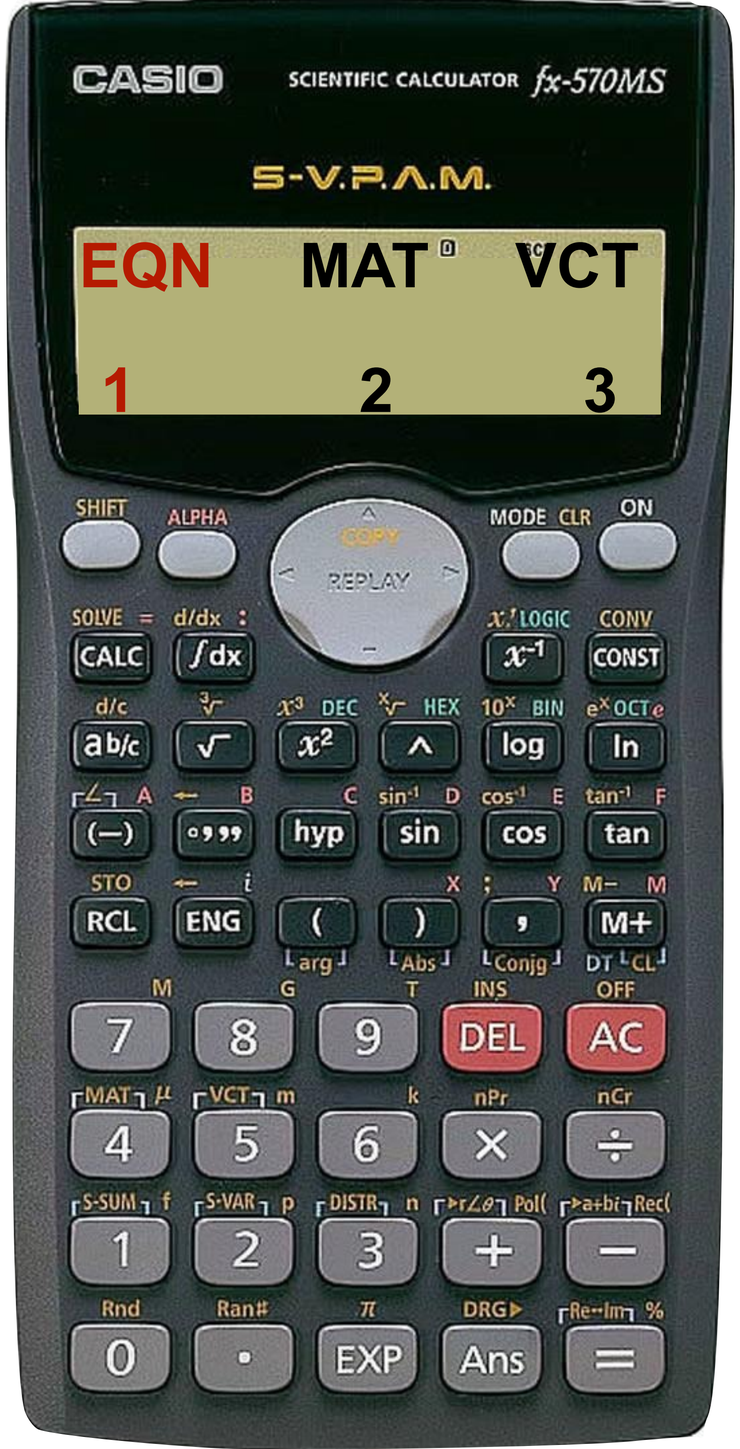
Turn on your calculator.



3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

Push the button **MODE** until **EQN** appears and push button **1**.

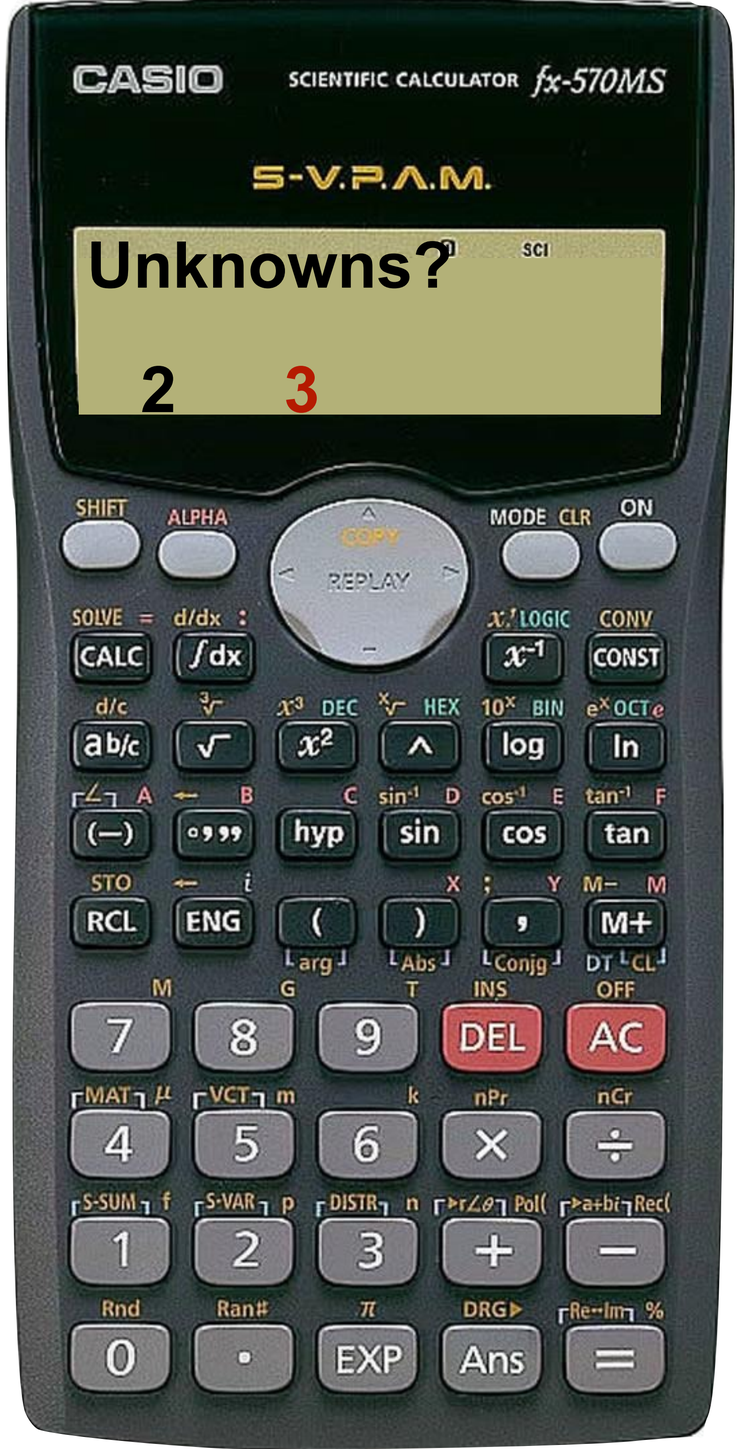


3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

UNKNOWNS? will appear

push the button **3**.



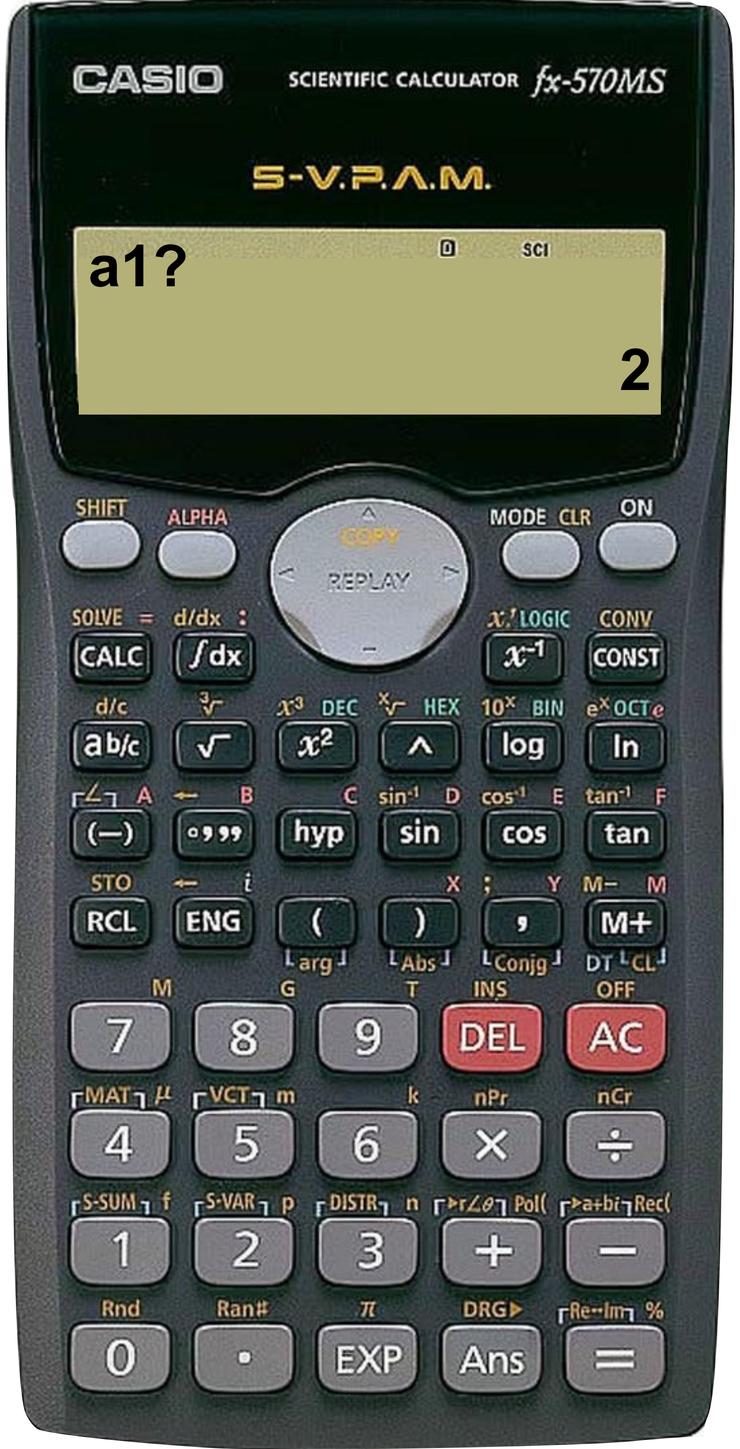
3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

$$2x + y - z = 7 \quad \text{—— } 1$$

$$x - y + z = 2 \quad \text{—— } 2$$

$$x + y - 3z = 2 \quad \text{—— } 3$$



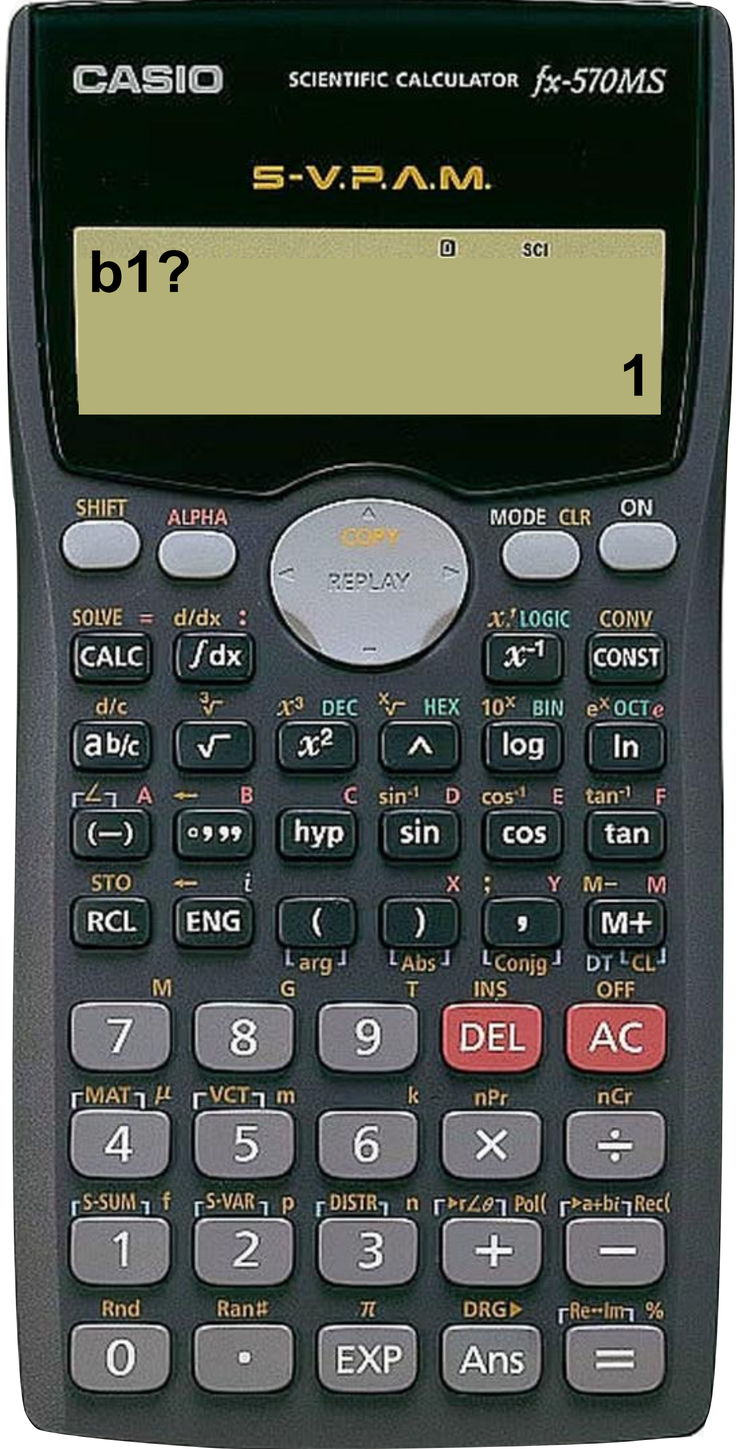
3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

$$2x - y - z = 7 \quad \text{—— } 1$$

$$x - y + z = 2 \quad \text{—— } 2$$

$$x + y - 3z = 2 \quad \text{—— } 3$$



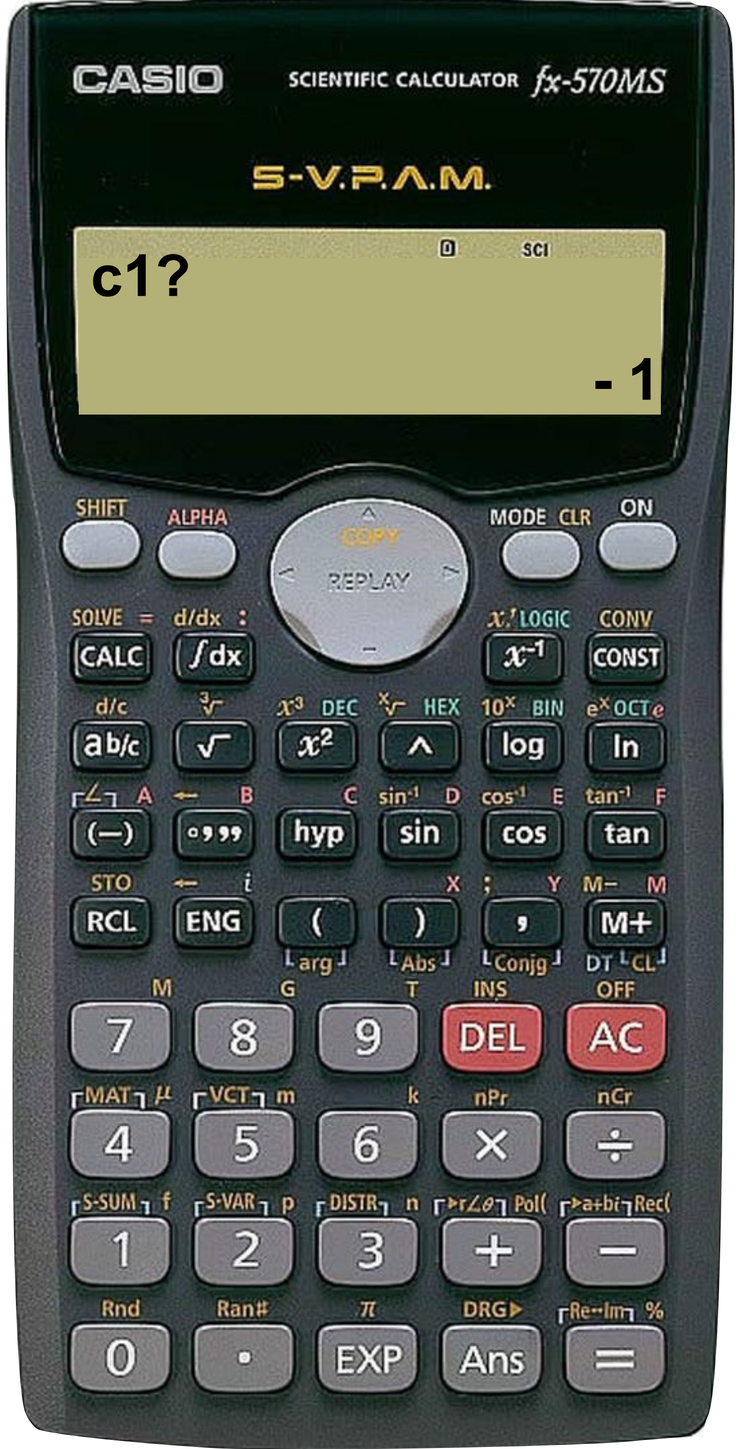
3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

$$2x + y - z = 7 \quad \text{—— } 1$$

$$x - y + z = 2 \quad \text{—— } 2$$

$$x + y - 3z = 2 \quad \text{—— } 3$$



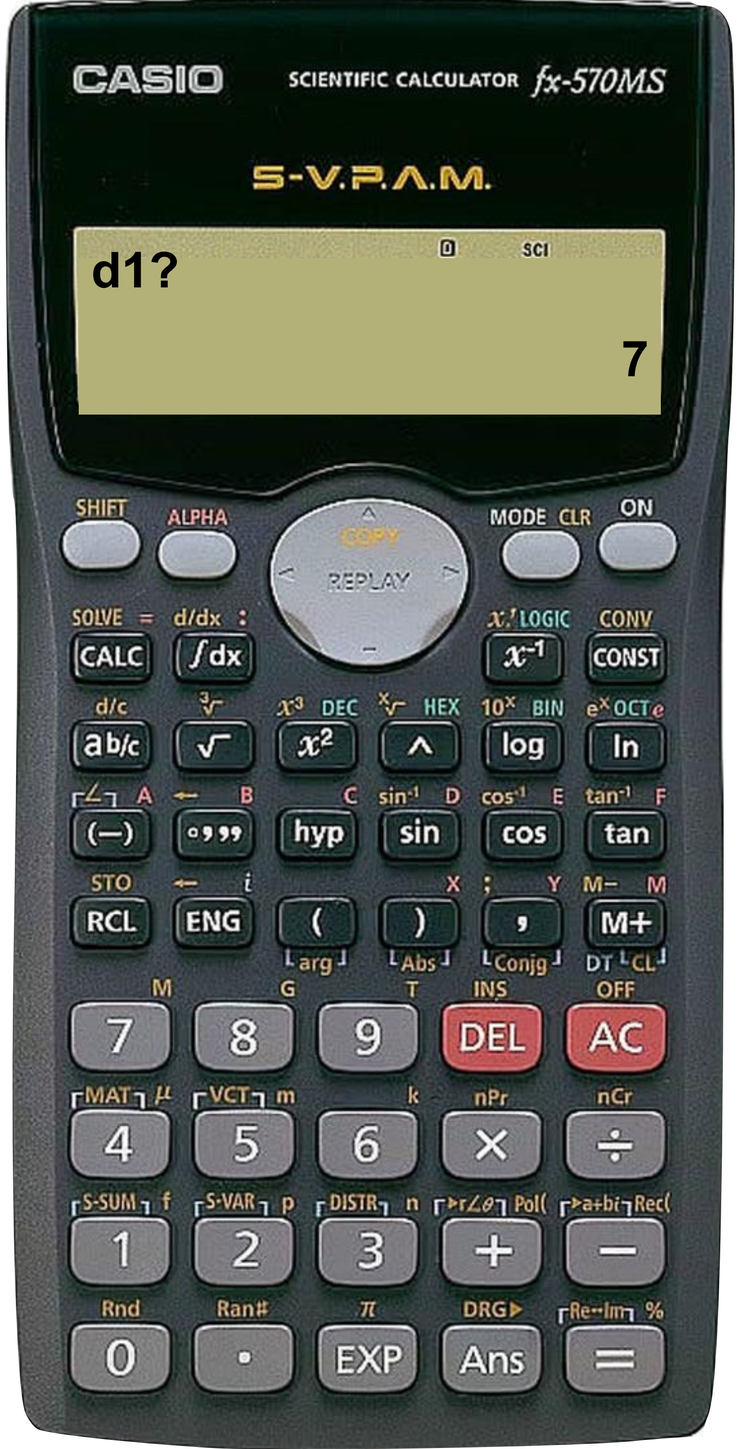
3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

$$2x + y - z = 7 \quad \text{—— } 1$$

$$x - y + z = 2 \quad \text{—— } 2$$

$$x + y - 3z = 2 \quad \text{—— } 3$$



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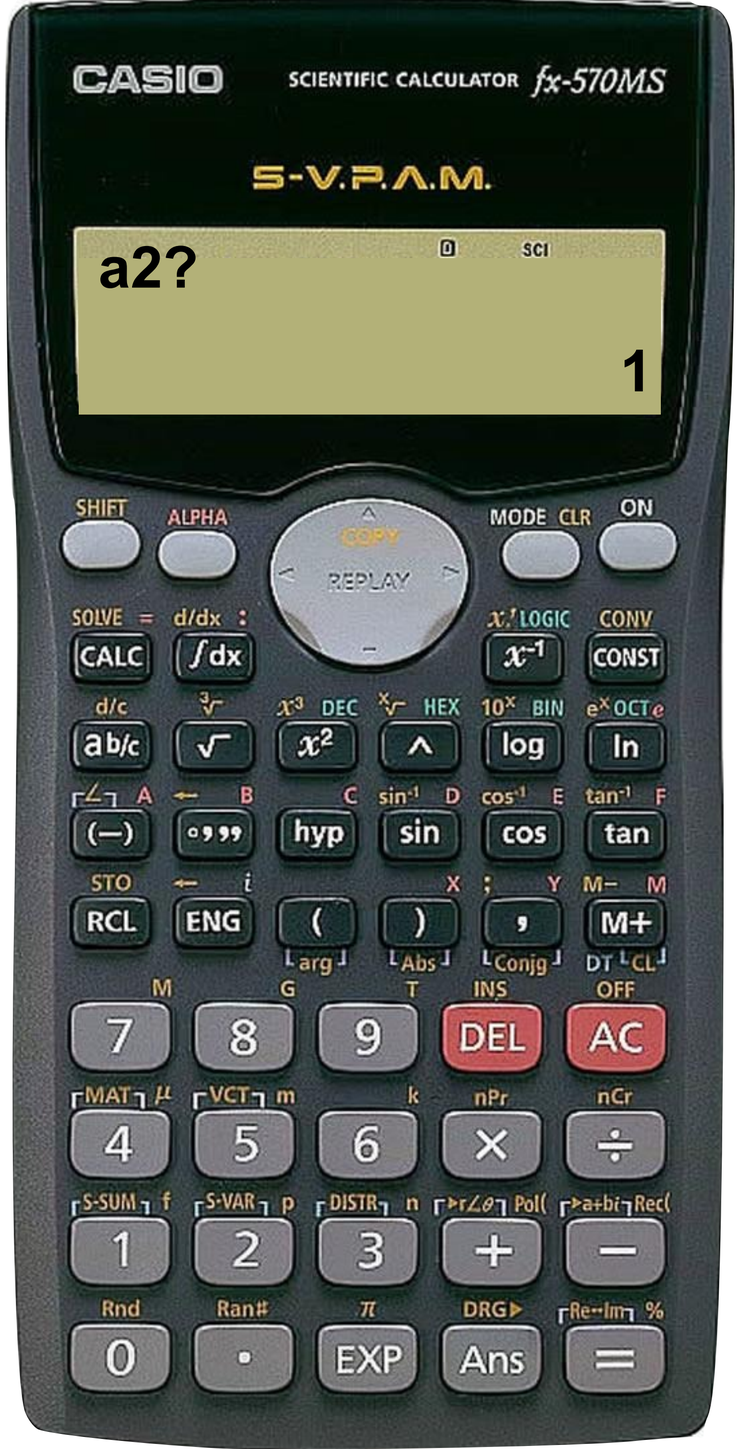
$$x + y - 3z = 2 \quad \text{—— } 3$$



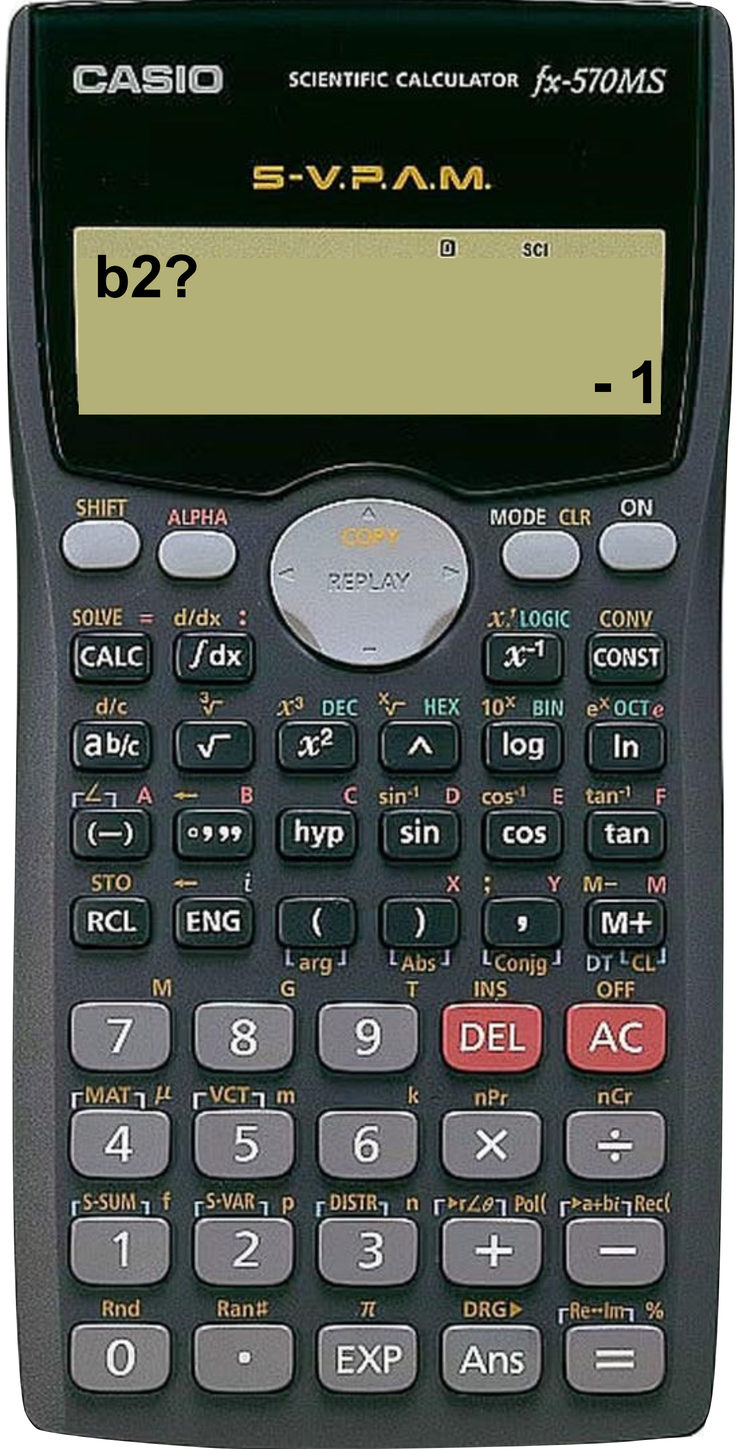
3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

$$2x + y - z = 7 \quad \text{—— } 1$$

$$x - y + z = 2 \quad \text{—— } 2$$

$$x + y - 3z = 2 \quad \text{—— } 3$$



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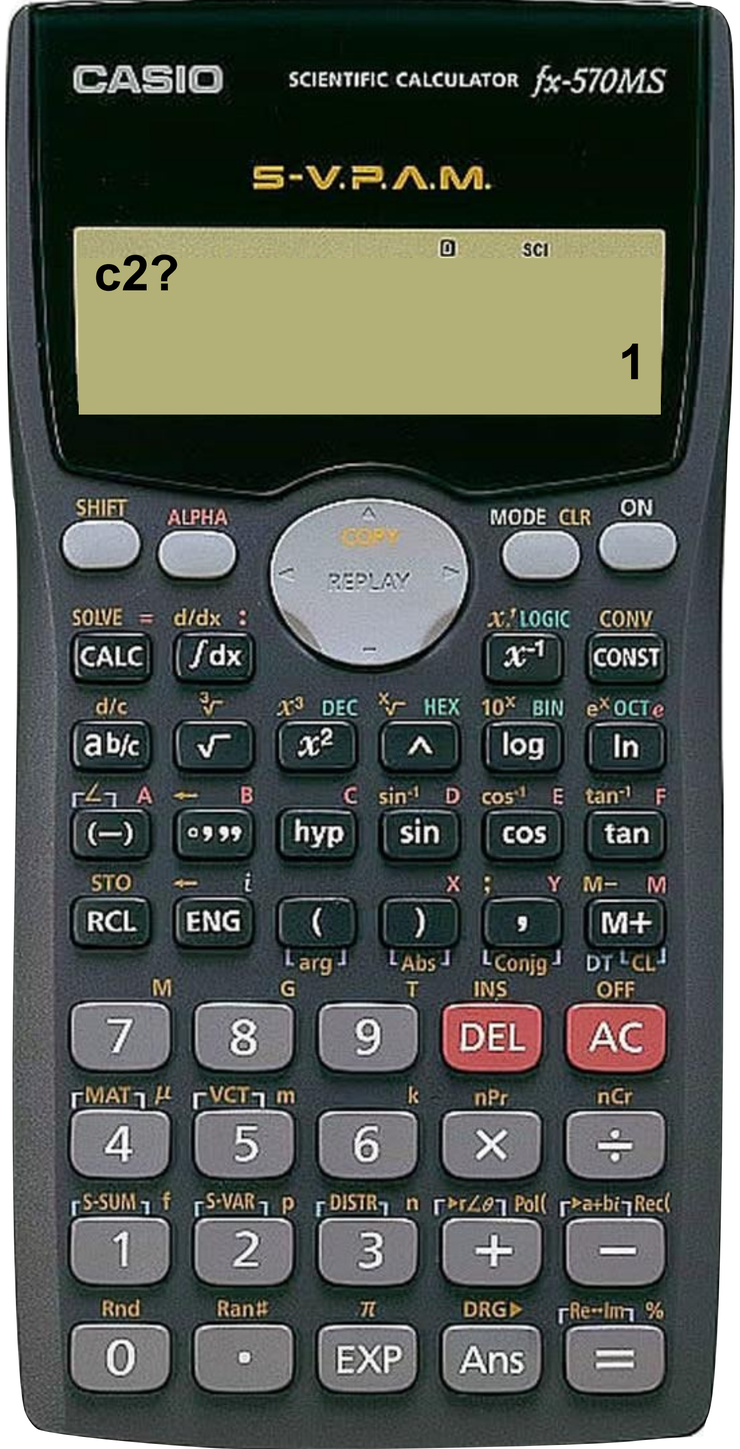
The use of calculator is only to verify your final answers.

$$2x + y - z = 7 \quad \text{—— } 1$$

$$x - y + z = 2 \quad \text{—— } 2$$

$$x + y - 3z = 2 \quad \text{—— } 3$$



3.1 System of linear equations in three variables.

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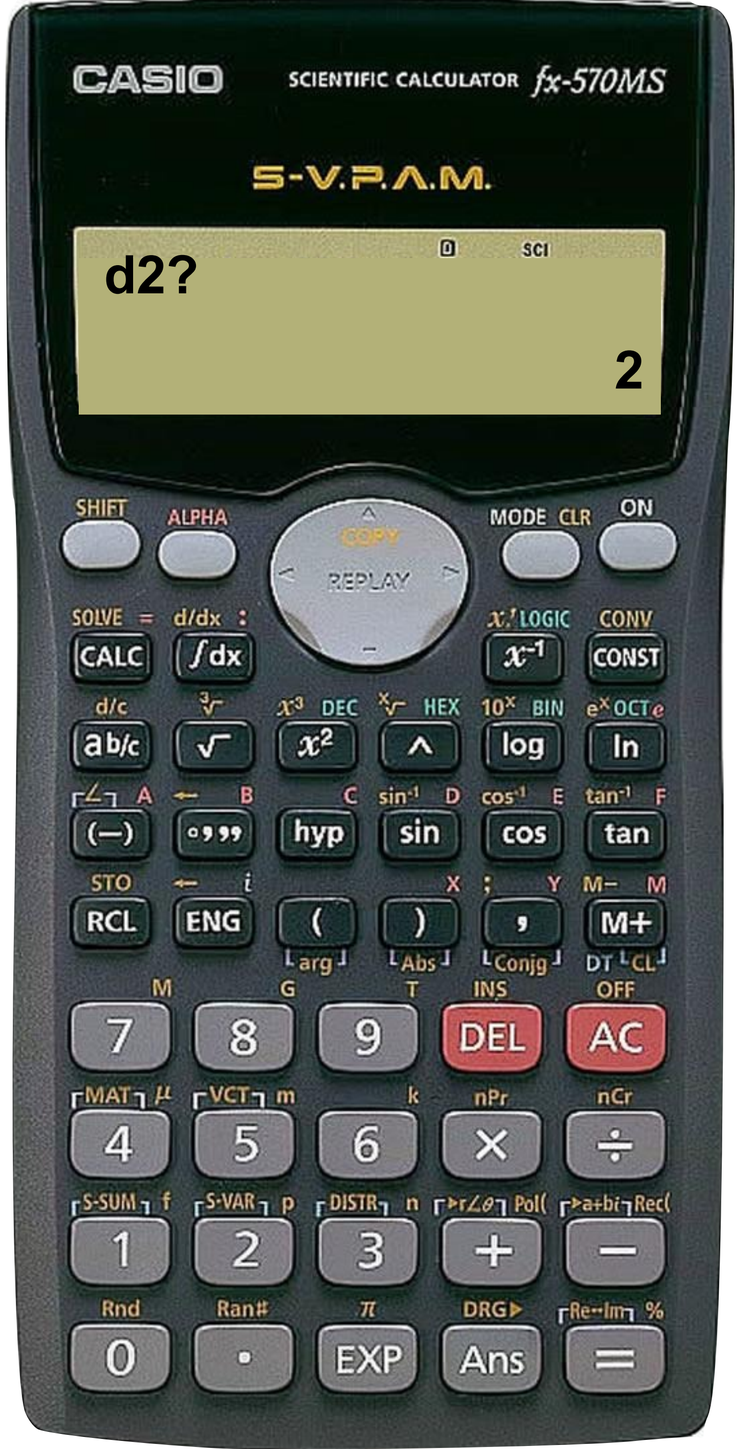

3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

$$2x + y - z = 7 \quad \text{—— } 1$$

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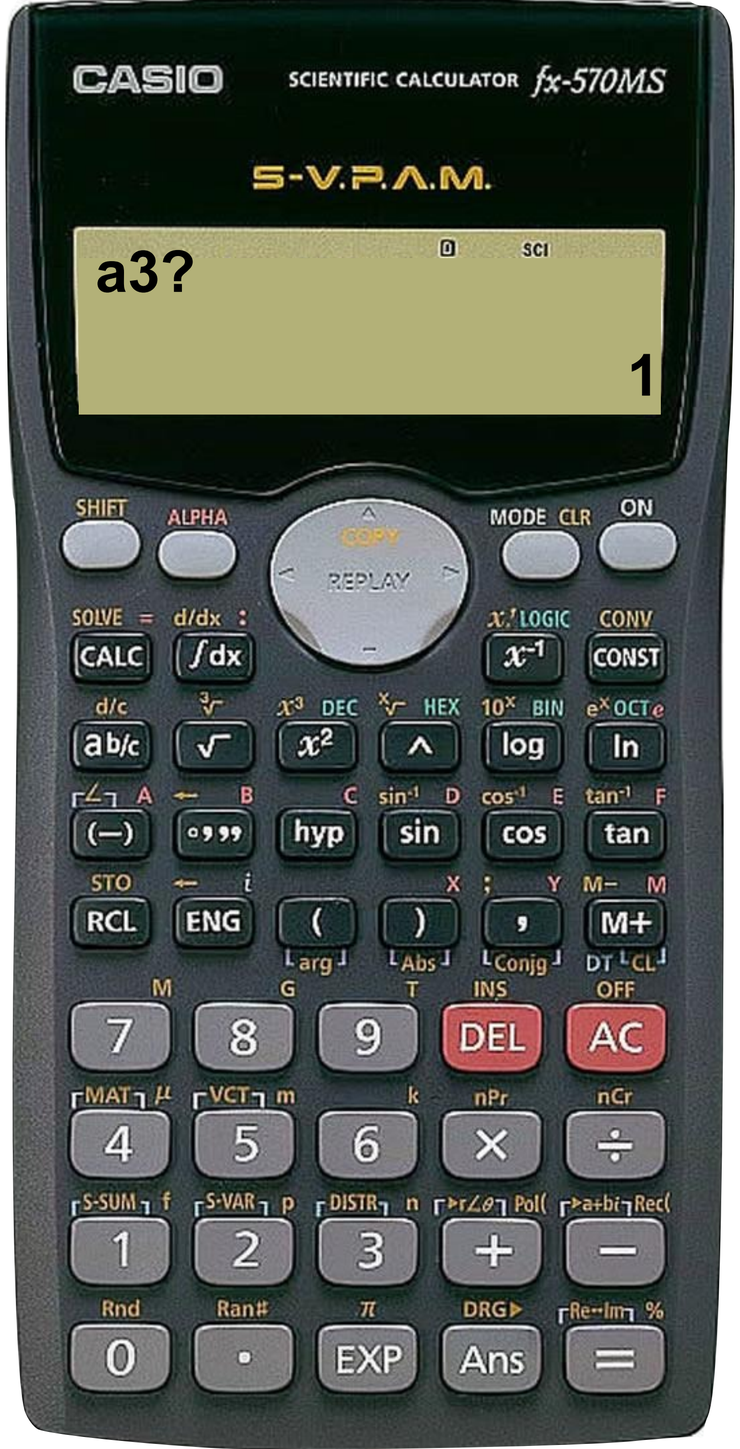
$$x - y - 3z = 2 \quad \text{—— } 3$$



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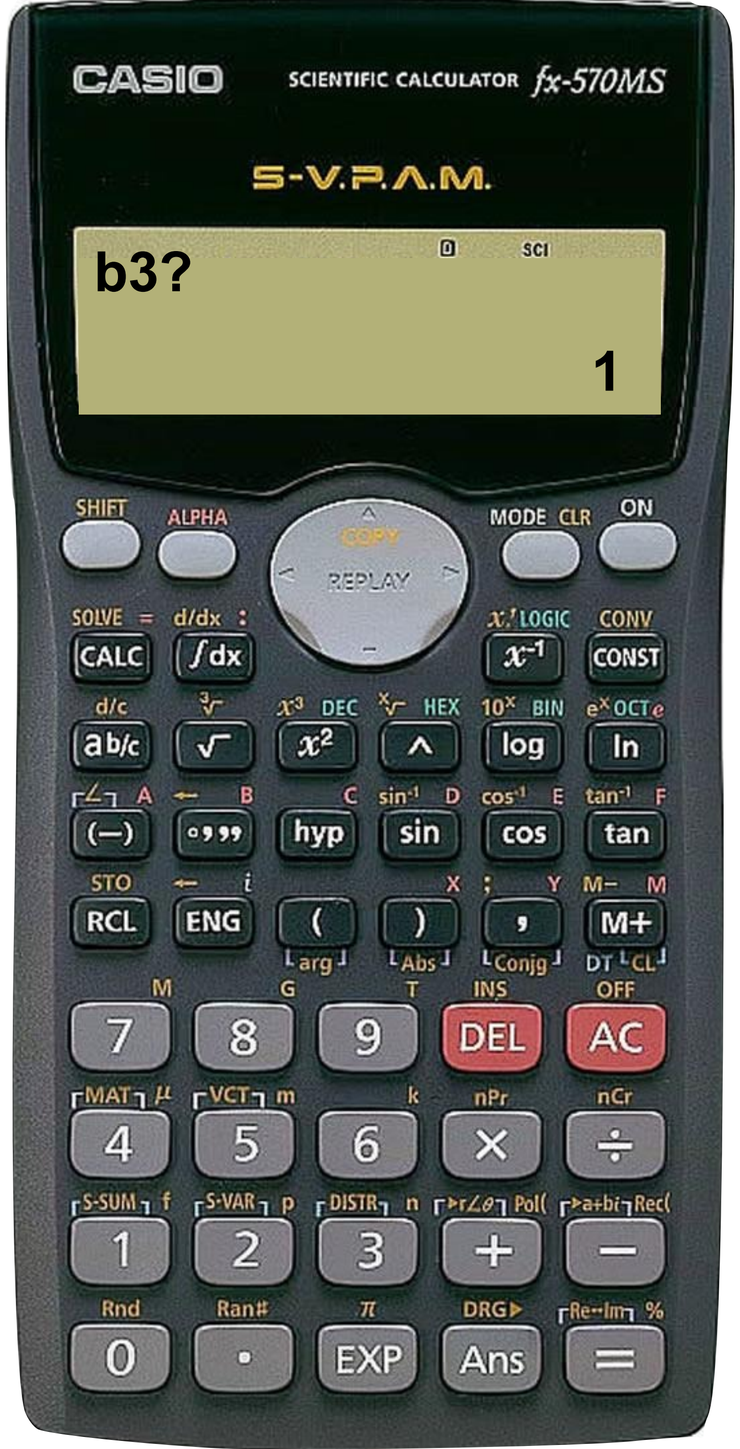

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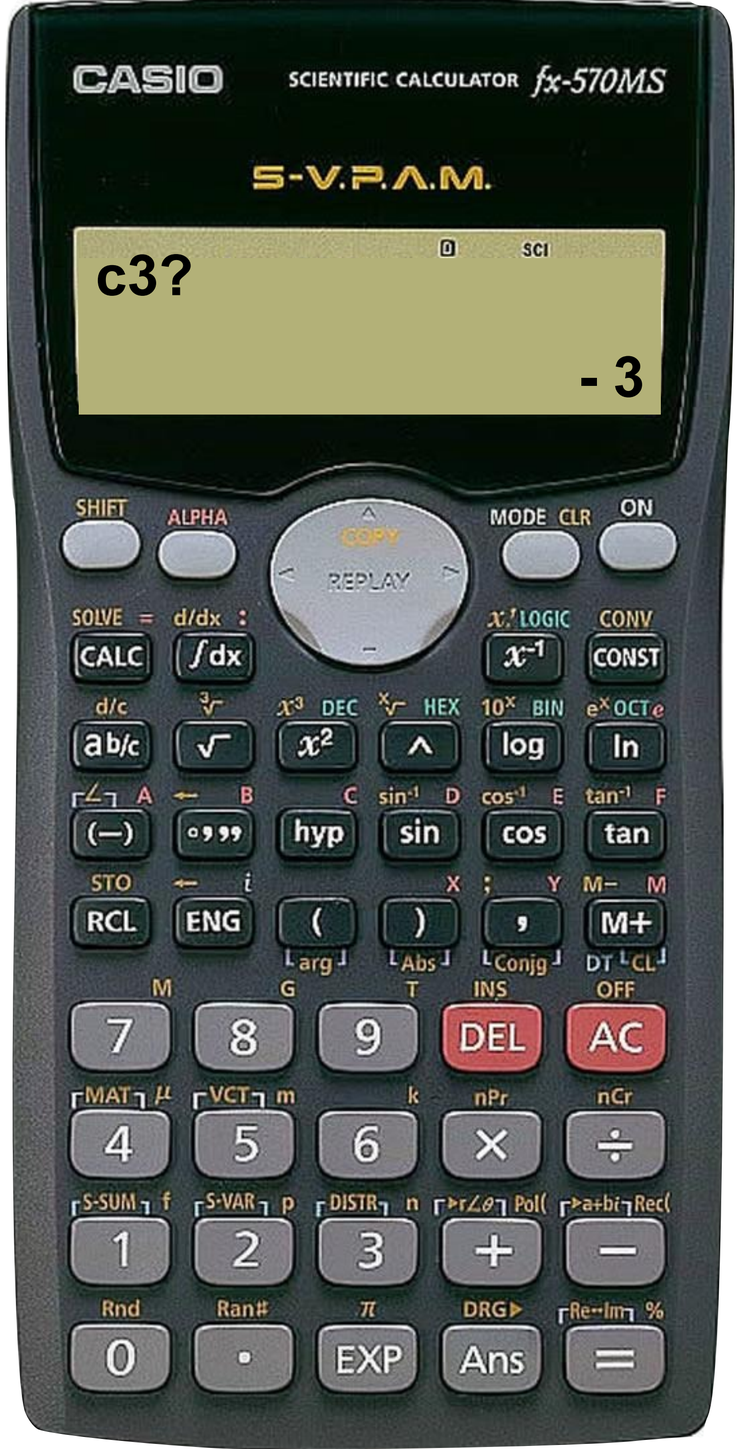

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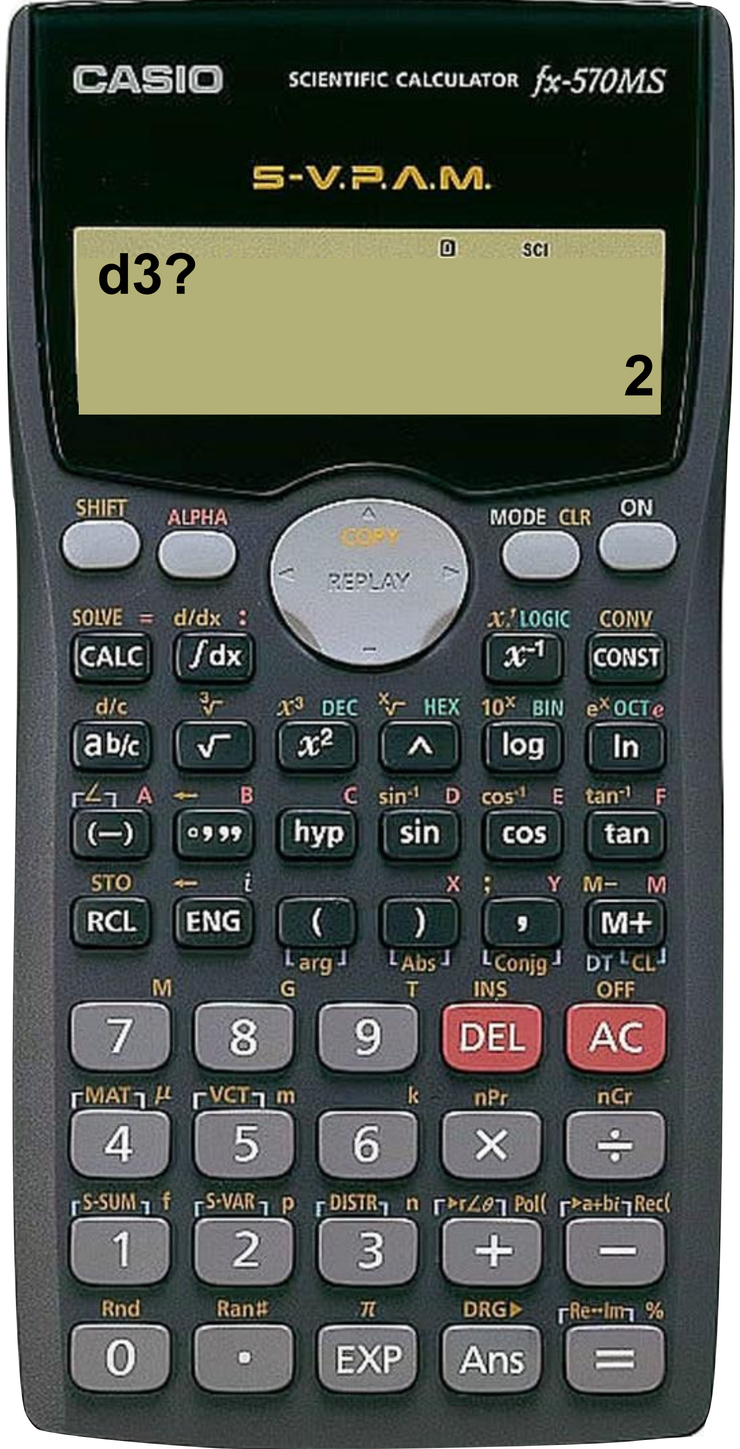


3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

$2x + y - z = 7$ —— 1

$x - y + z = 2$ —— 2

$x + y - 3z = 2$ —— 3

Eliminates y and z by 1 + 2,

$2x + x + y + (-y) - z + z = 7 + 2$

$3x = 9$

$x = 3$

Substitute $x = 3$ in 2 and 3

$3 - y + z = 2$

$-y + z = -1$ —— 4

$3 + y - 3z = 2$

$y - 3z = -1$ —— 5

Eliminates y by 4 + 5,

$-y + y + z + (-3z) = -1 + (-1)$

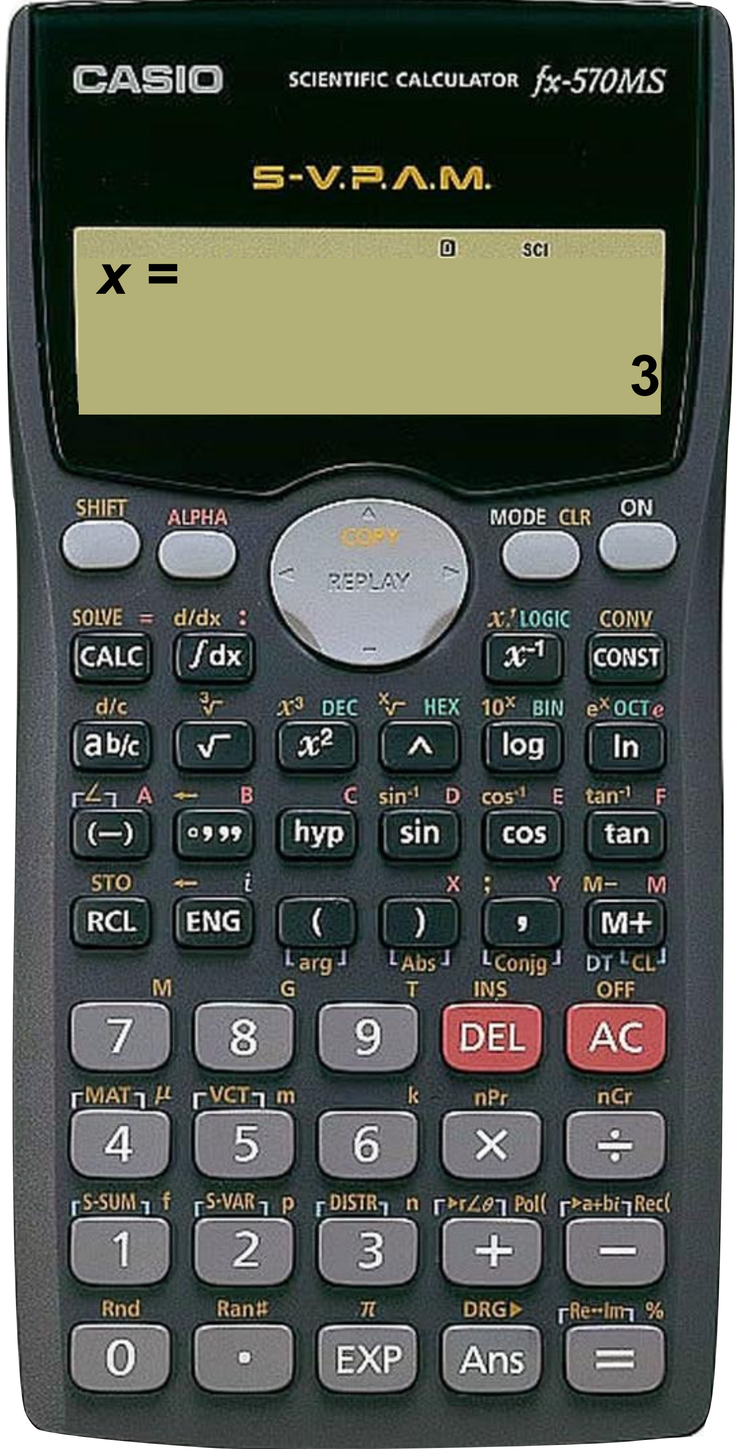
$-2z = -2$

$z = 1$

Substitute $x = 3$ and $z = 1$ in 1

$2(3) + y - 1 = 7$

$y = 2$



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$-2z = -2$

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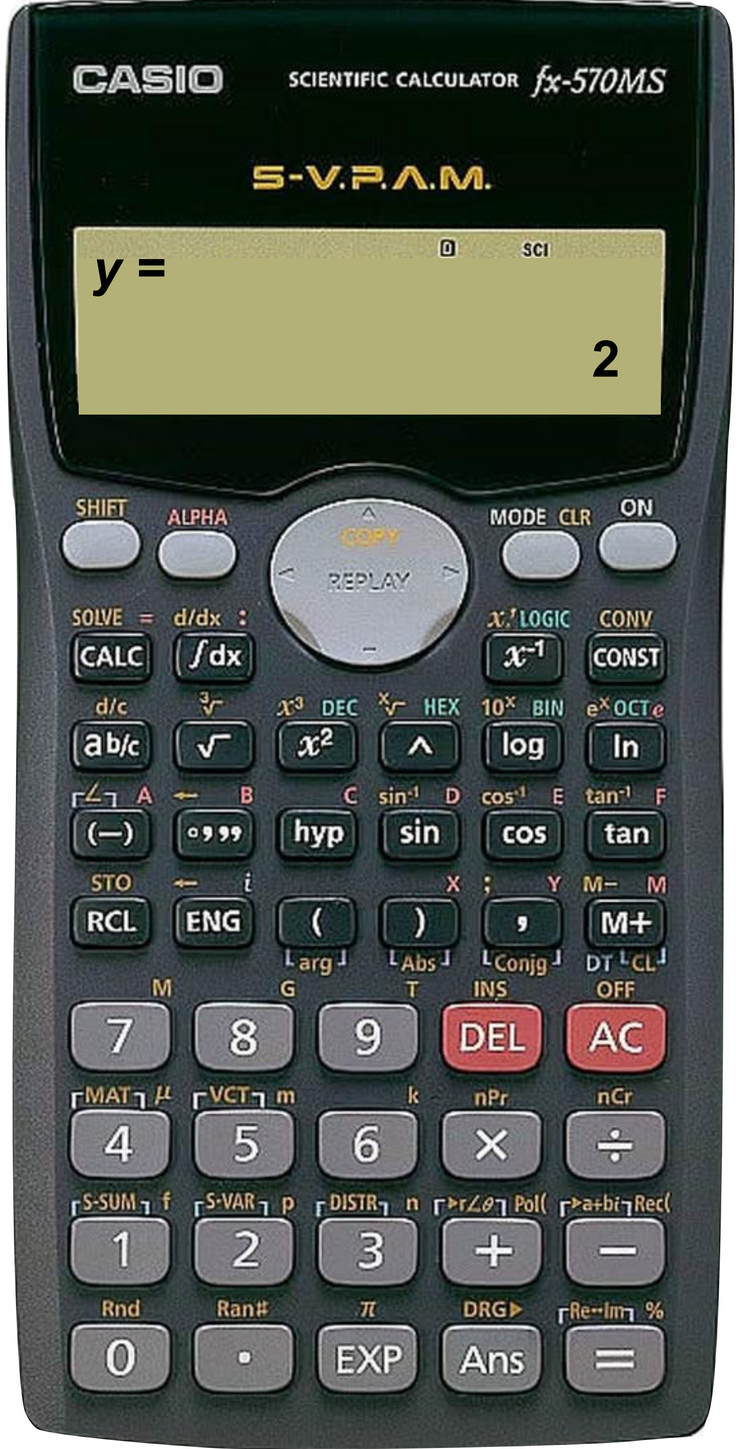
Substitute $x = 3$ and $z = 1$ in 1

$2(3) + y - 1 = 7$

$y = 2$



3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.

$2x + y - z = 7$ —— 1

$x - y + z = 2$ —— 2

$x + y - 3z = 2$ —— 3

Eliminates y and z by 1 + 2,

$2x + x + y + (-y) - z + z = 7 + 2$

$3x = 9$

$x = 3$

Substitute $x = 3$ in 2 and 3

$3 - y + z = 2$

$-y + z = -1$ —— 4

$3 + y - 3z = 2$

$y - 3z = -1$ —— 5

Eliminates y by 4 + 5,

$-y + y + z + (-3z) = -1 + (-1)$

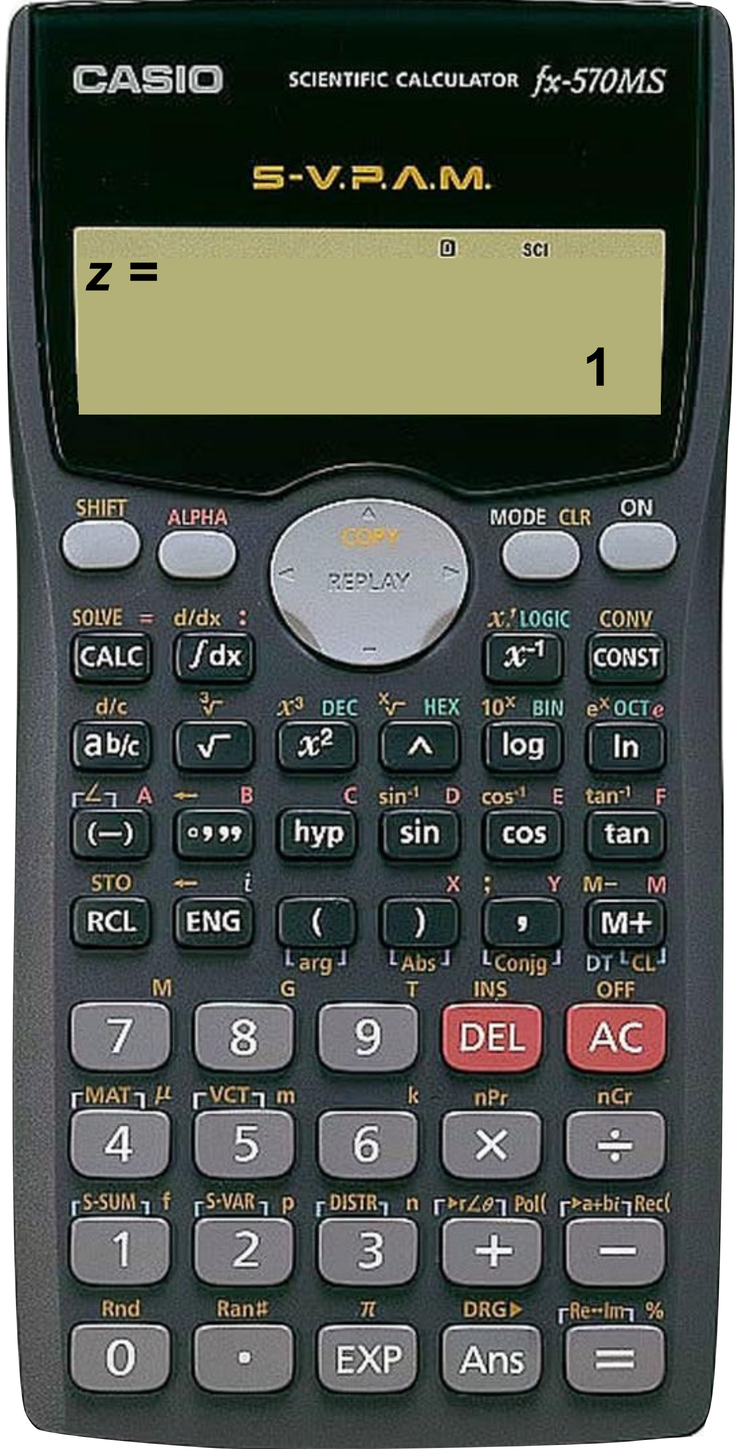
$-2z = -2$

$z = 1$

Substitute $x = 3$ and $z = 1$ in 1

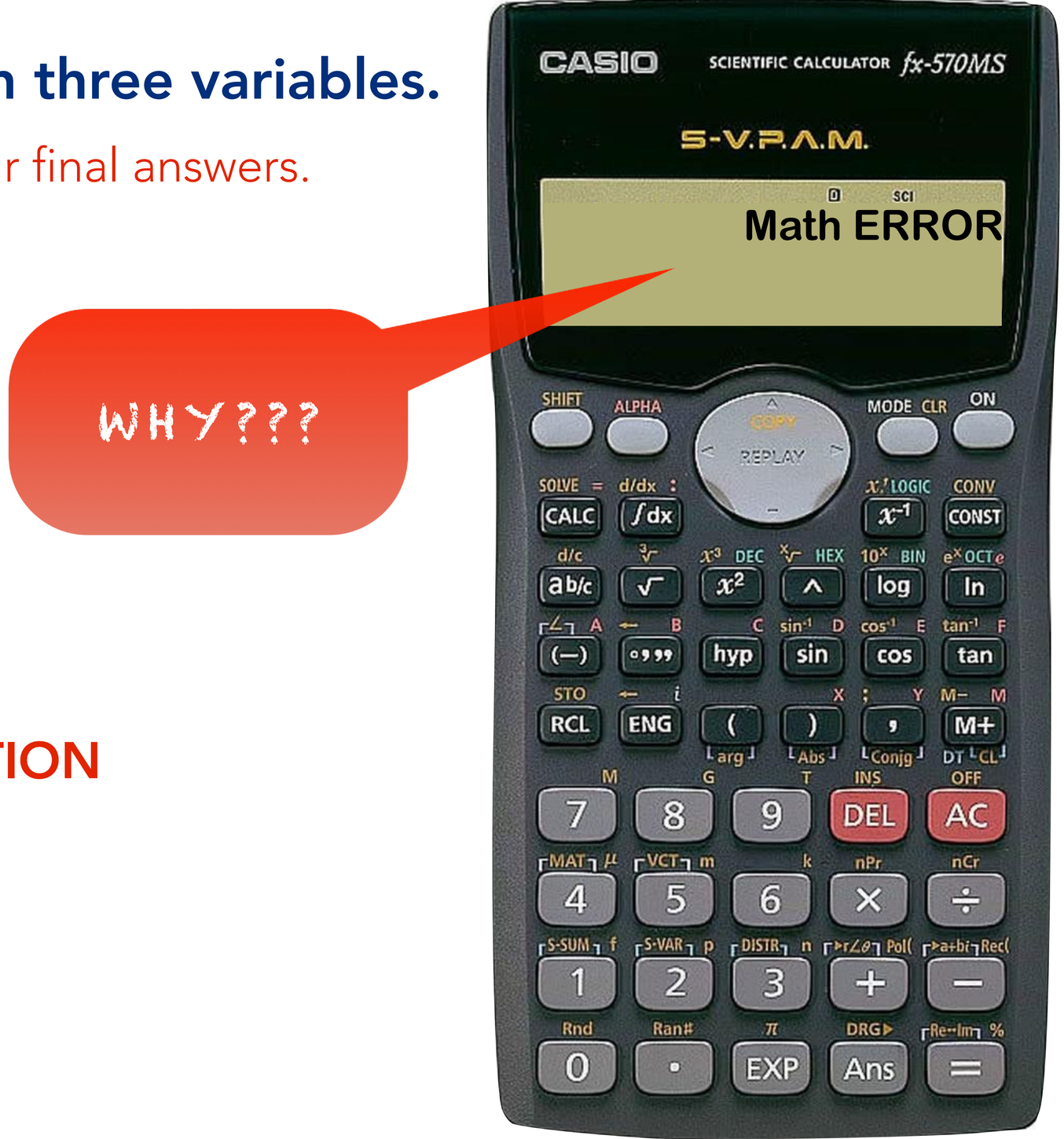
$2(3) + y - 1 = 7$

$y = 2$



3.1 System of linear equations in three variables.

The use of calculator is only to verify your final answers.



This happens when the systems has

NO SOLUTION or **INFINITE SOLUTION**

3.1 System of linear equations in three variables.

Example 3

Solve the following simultaneous equations :

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

$$y - 2z = -3$$

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

3.1 System of linear equations in three variables.

Solution 3

$$-x + 2y + z = 2 \quad \text{—— 1}$$

$$y - 2z = -3 \quad \text{—— 2}$$

$$x + 4y - z = 4 \quad \text{—— 3}$$

Eliminates x by 1 + 3

$$-x + x + 2y + 4y + z + (-z) = 2 + 4$$

$$6y = 6$$

$$y = 1$$

Substitute $y = 1$ in 2

$$1 - 2z = -3$$

$$-2z = -4$$

$$z = 2$$

Substitute $y = 1$ and $z = 2$ in 3

$$x + 4(1) - 2 = 4$$

$$x = 2$$

3.1 System of linear equations in three variables.

- Case of **NO SOLUTION** $(a = b)$

Example 4

Solve the following simultaneous equations :

$x - y + 3z = 3,\ -2x + 2y - 6z = 6,\ y - 5z = -3$

Answer :

$$x - y + 3z = 3 \quad \text{—— 1}$$

$$-2x + 2y - 6z = 6 \quad \text{—— 2}$$

$$y - 5z = -3 \quad \text{—— 3}$$

From 1, $x = 3 + y - 3z$ —— 4

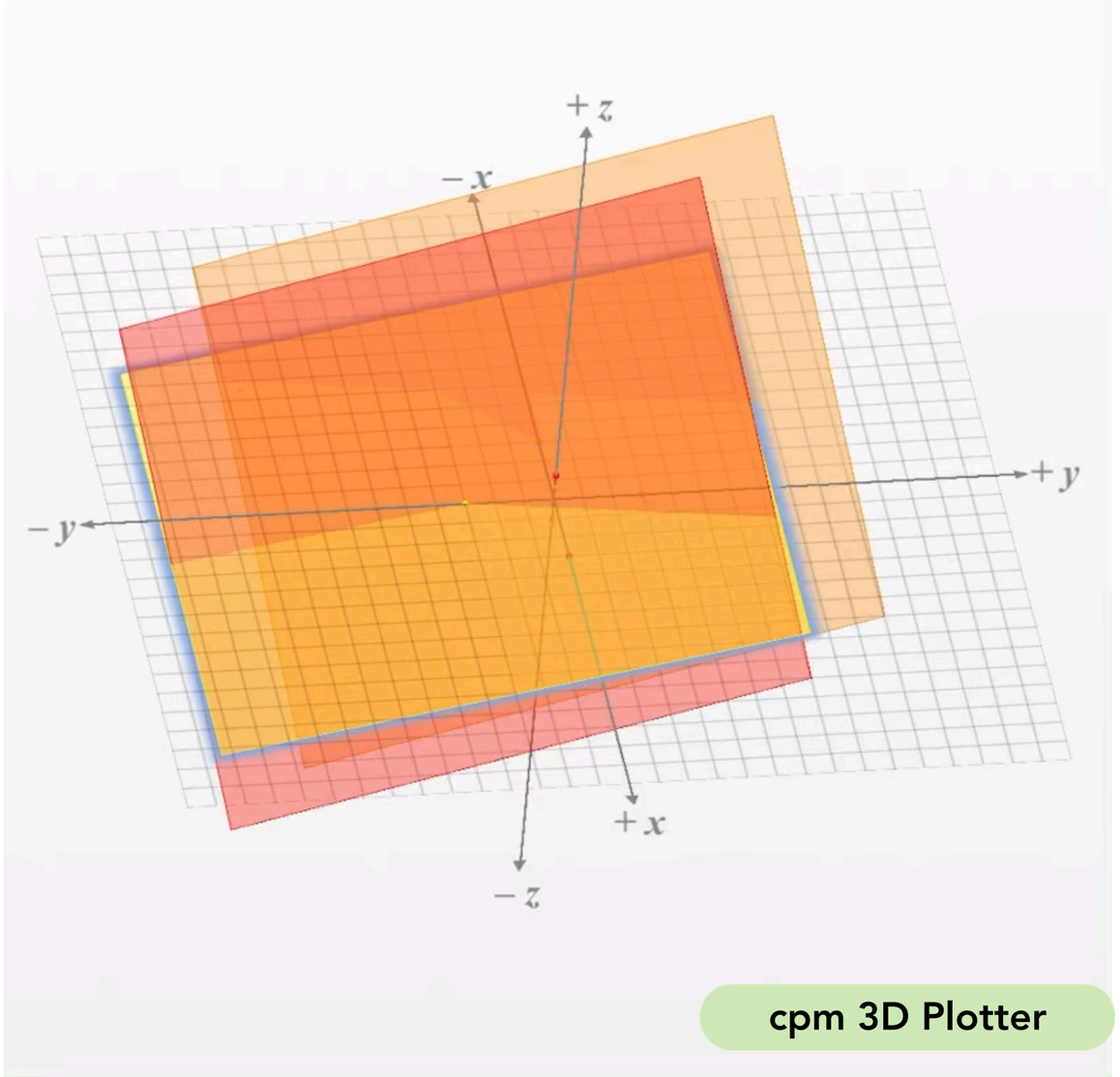
Substitute 4 in 2,

$$-2(3 + y - 3z) + 2y - 6z = 6$$

$$-6 = 6$$

a=b

Hence, no solution since $-6 \neq 6$



3.1 System of linear equations in three variables.

- Case of **INFINITE SOLUTION** $(0 = 0)$

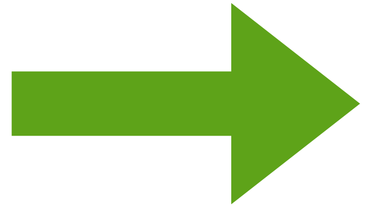
Example 5

Solve the following equations:

$$3x + 5y - 2z = 13$$

$$-5x - 2y - 4z = 20$$

$$-14x - 17y + 2z = -19$$



Solution 5

$3x + 5y - 2z = 13$ —— 1

$-5x - 2y - 4z = 20$ —— 2

$-14x - 17y + 2z = -19$ —— 3

Eliminates z :

Multiply 1 and 3 to equate the coefficient of z

Eliminates z from the first and second equations

1 $\times 2$: $6x + 10y - 4z = 26$ —— 4

4 − 2 : $6x - (-5x) + 10y - (-2y) - 4z - (-4z) = 26 - 20$

$11x + 12y = 6$ —— 5

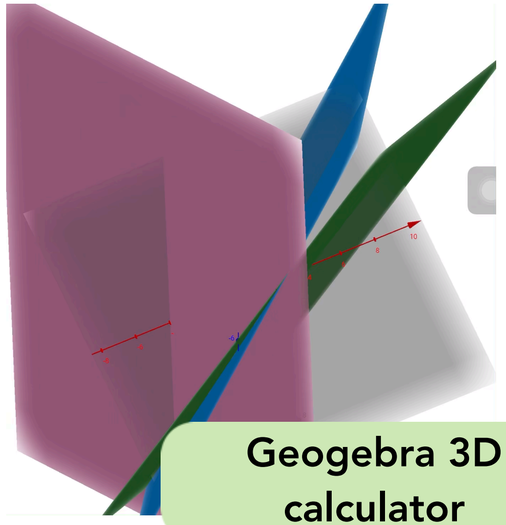
3 $\times 2$: $-28x - 34y + 4z = -38$ —— 6

6 + 2 : $-28x + (-5x) - 34y + (-2y) + 4z + (-4z) = -38 + 20$

$-33x - 36y = -18$ —— 7

5 $\times 3$: $33x + 36y = 18$ —— 8

7 + 8 : $-33x + 33x - 36y + 36y = -18 + 18$



Geogebra 3D calculator

Eliminates z from the second and third equations

$0 = 0$, **Hence infinite solutions.**

Solution 5 (Alternative)

$3x + 5y - 2z = 13$ —— 1

$-5x - 2y - 4z = 20$ —— 2

$-14x - 17y + 2z = -19$ ——3

Eliminates z :

1 + 3 : $3x + (-14x) + 5y + (-17y) - 2z + (+2z) = 13 + (-19)$

$-11x - 12y = -6$ —— 4

1 $\times 2$: $6x + 10y - 4z = 26$ —— 5

5 – 2 : $6x - (-5x) + 10y - (-2y) - 4z - (-4z) = 26 - 20$

$11x + 12y = 6$ —— 6

6 + 4 : $-11x + (+11x) - 12y + (+12y) = -6 + (+6)$

$0 = 0$, **Hence infinite solutions.**

3.1 System of linear equations in three variables.

Example 6

Zulaikha, Qistina and Aina went to a convenience store after a group study. All three of them bought similar items before went home. Zulaikha bought a bottle of mineral water, a candy bar and 2 bags of crackers for RM13. Qistina bought 2 mineral waters, a candy bar and 2 bags of crackers for RM17. Aina bought 3 mineral waters, 3 candy bars and 2 bag of crackers for RM27. Find the price of each mineral water, candy bar and a bag of cracker.

Solution 6

Understanding the problem

Solution 6

Zulaikha :

- A bottle of mineral water = x
- A candy bar = y
- Two bags of crackers = $2z$

For RM13

$$x + y + 2z = 13$$

Qistina :

- Two bottle of mineral water = $2x$
- A candy bar = y
- Two bags of crackers = $2z$

For RM17

$$2x + y + 2z = 17$$

Aina :

- Three bottle of mineral water = $3x$
- Three candy bar = $3y$
- Two bags of crackers = $2z$

For RM27

$$3x + 3y + 2z = 27$$

- Find the price for each mineral water, candy bar and a bag of cracker.
- Find the value of x , y and z

Solution 6

Planning strategy

A Mineral water $= x$

A Candy bar $= y$

A bag of cracker $= z$

Using method of substitution or elimination.

$$x + y + 2z = 13$$

$$2x + y + 2z = 17$$

$$3x + 3y + 2z = 27$$

Solution 6

Implementing the strategy

Solution 6

$x + y + 2z = 13$ —— 1

$2x + y + 2z = 17$ —— 2

$3x + 3y + 2z = 27$ ——3

From 1, $x = 13 - y - 2z$ —— 4

Substitute 4 in 2 :

$2(13 - y - 2z) + y + 2z = 17$

$-y - 2z = -9$ —— 5

Substitute 4 in 3 :

$3(13 - y - 2z) + 3y + 2z = 27$

$z = 3$

Substitute $z = 3$ in 5

$-y - 2(3) = -9$

$y = 3$

Substitute $y = 3$ and $z = 3$ in 4 to get x

$x = 13 - 3 - 2(3)$

$x = 4$

Solution 6 (Alternative)

$x + y + 2z = 13$ —— **1**

$2x + y + 2z = 17$ —— **2**

$3x + 3y + 2z = 27$ ——**3**

Eliminate y and z by 2 − 1 :

$$2x - x + y - (+y) + 2z - (+2z) = 4$$

$x = 4$

Eliminate z by 3 − 2 :

$$3x - (+2x) + 3y - (+y) + 2z - (+2z) = 27 - 17$$

$$x + 2y = 10$$

$$4 + 2y = 10$$

$$2y = 6$$

$y = 3$

Substitute $x = 4$ and $y = 3$ in 1

$$4 + 3 + 2z = 13$$

$$2z = 6$$

$z = 3$

Solution 6

Making conclusion

A Mineral water $= RM4$

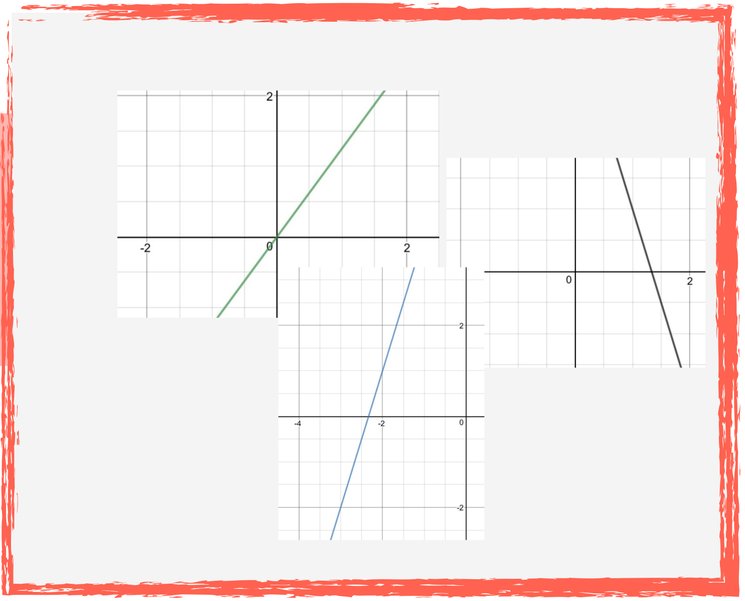
A Candy Bar $= RM3$

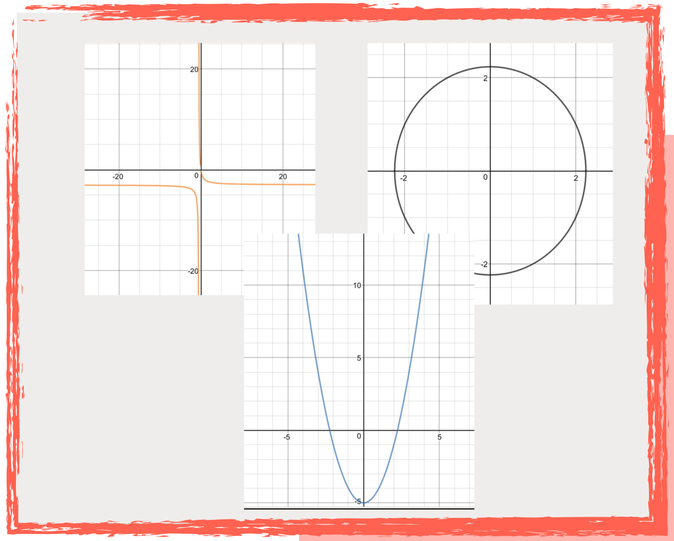
A bag of cracker $= RM3$

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Involves LINEAR EQUATIONS $ax + by = c$

where *a*, *b* & *c* are constants.





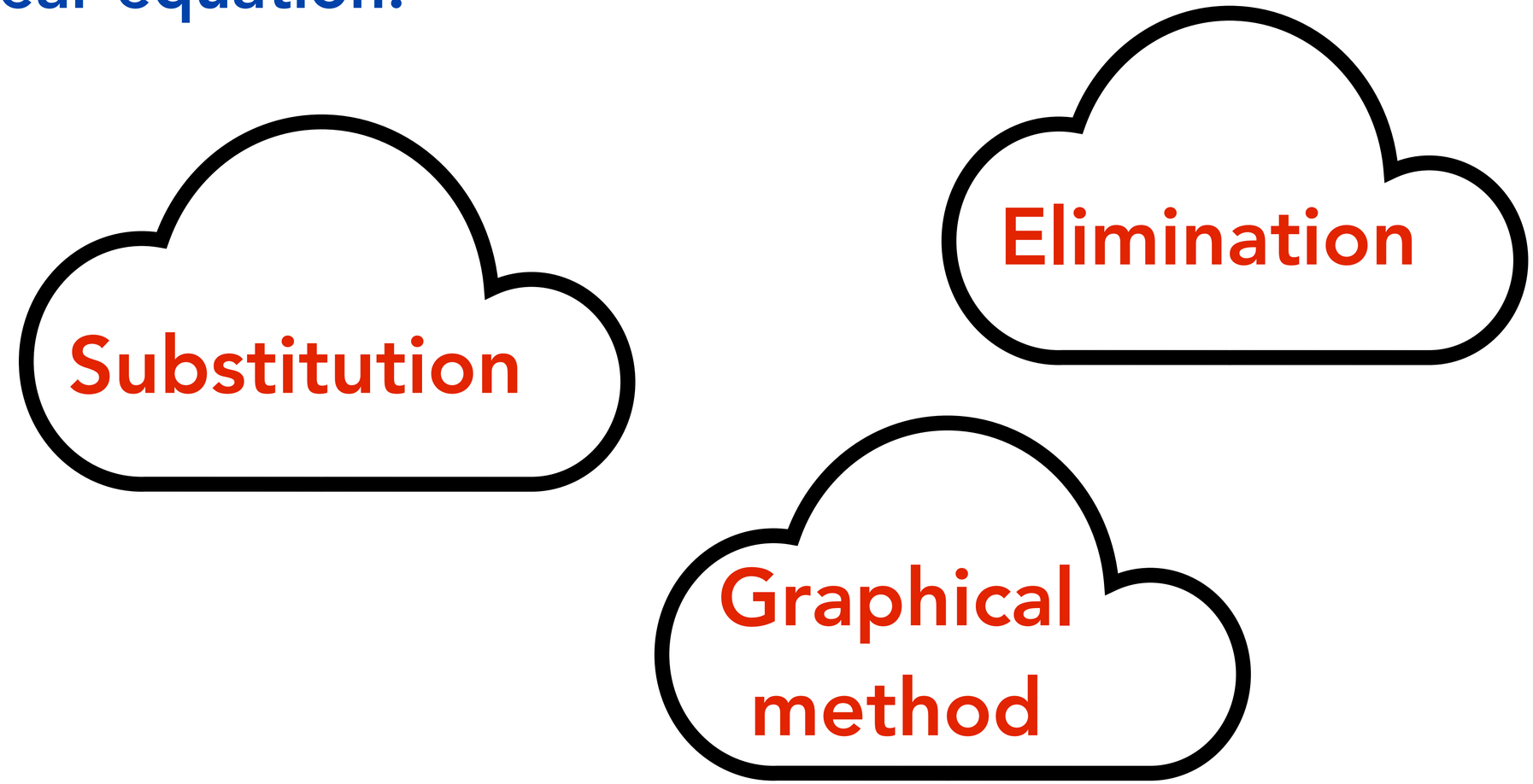
Involves NON-LINEAR EQUATIONS

$$ay^2 + bx^2 = c \text{ or } \frac{a}{y} + \frac{b}{x} = c$$

where *a*, *b* & *c* are constants.

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Methods to find the solution when given a linear equation and a non-linear equation.

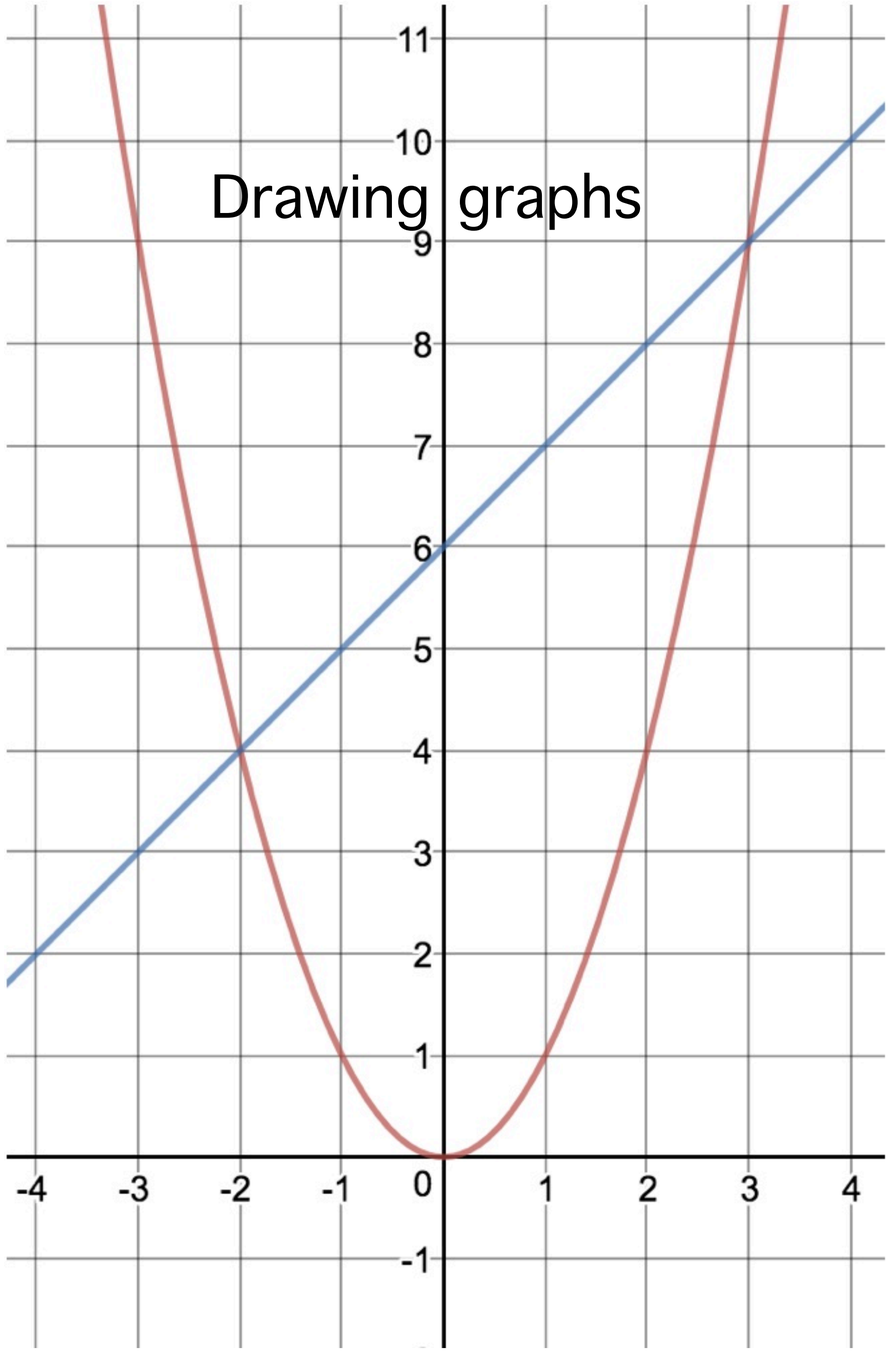


Prior knowledge :
Solving Quadratic Equations (Form 4)

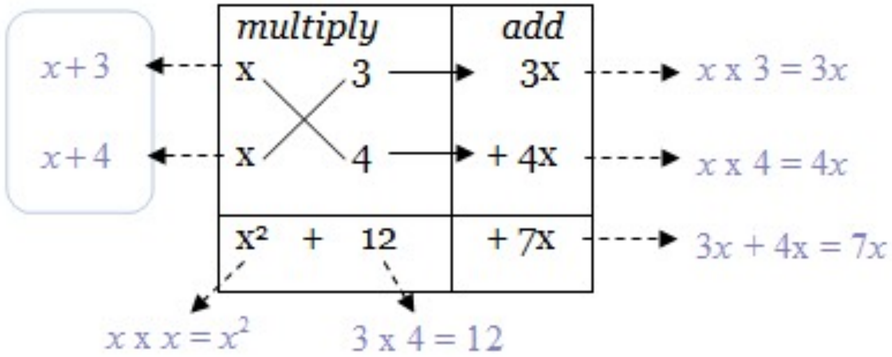
https://anyflip.com/reyq/mckj

DO YOU REMEMBER?

Drawing graphs



Factorization



Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

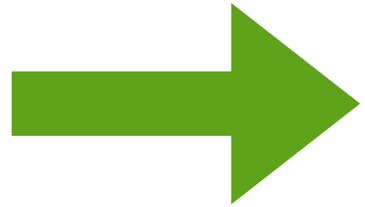
Example 7

Solve the following simultaneous equations :

$$x - 3y = 1 \,, \quad x^2 + 3xy + 9y^2 = 7$$

[5 marks]

SPM 2017



3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 7

$$x - 3y = 1 \text{ —— } 1$$

$$x^2 + 3xy + 9y^2 = 7 \text{ —— } 2$$

From 1 : $x = 1 + 3y$ —— 3 ✓ P1

Substitute 3 in 2 :

$$(1 + 3y)^2 + 3(1 + 3y)y + 9y^2 = 7$$ ✓ K1

$$1 + 6y + 9y^2 + 3y + 9y^2 + 9y^2 = 7$$

$$27y^2 + 9y - 6 = 0$$

$$9y^2 + 3y - 2 = 0$$

$a = 9 , b = 3 , c = -2$

$$y = \frac{-3 \pm \sqrt{3^2 - 4(9)(-2)}}{2(9)}$$ ✓ K1

$$y = -\frac{2}{3} , y = \frac{1}{3}$$ ✓ N1

Substitute $y = -\frac{2}{3} , y = \frac{1}{3}$ in 3

When $y = -\frac{2}{3}$, $x = 1 + 3(-\frac{2}{3}) = -1$

When $y = \frac{1}{3}$, $x = 1 + 3(\frac{1}{3}) = 2$ ✓ N1

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

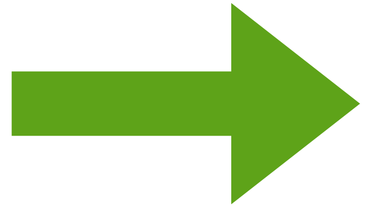
Example 8

Solve the following simultaneous equations :

$$3x - 2y = 8$$

$$2x^2 + 4xy = 5$$

Give your answer correct to three decimal places.



3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 8

$3x - 2y = 8$ —— 1

$2x^2 + 4xy = 5$ —— 2

Multiply 1 by $2x$: $6x^2 - 4xy = 16x$ —— 3 ✓ P1

3 + 2 : $6x^2 + 2x^2 - 4xy + 4xy = 16x + 5$ ✓ K1

$$8x^2 = 16x + 5$$

$$8x^2 - 16x - 5 = 0$$

$a = 8$, $b = -16$ & $c = -5$

$$x = \frac{-(-16) \pm \sqrt{(-16)^2 - 4(8)(-5)}}{2(8)}$$ ✓ K1

$x = -0.275$, $x = 2.275$ ✓ N1

Substitute $x = -0.275$, $x = 2.275$ in 1 to get the value of y

$3(-0.275) - 2y = 8$, $y = -4.413$

$3(2.275) - 2y = 8$, $y = -0.588$ ✓ N1

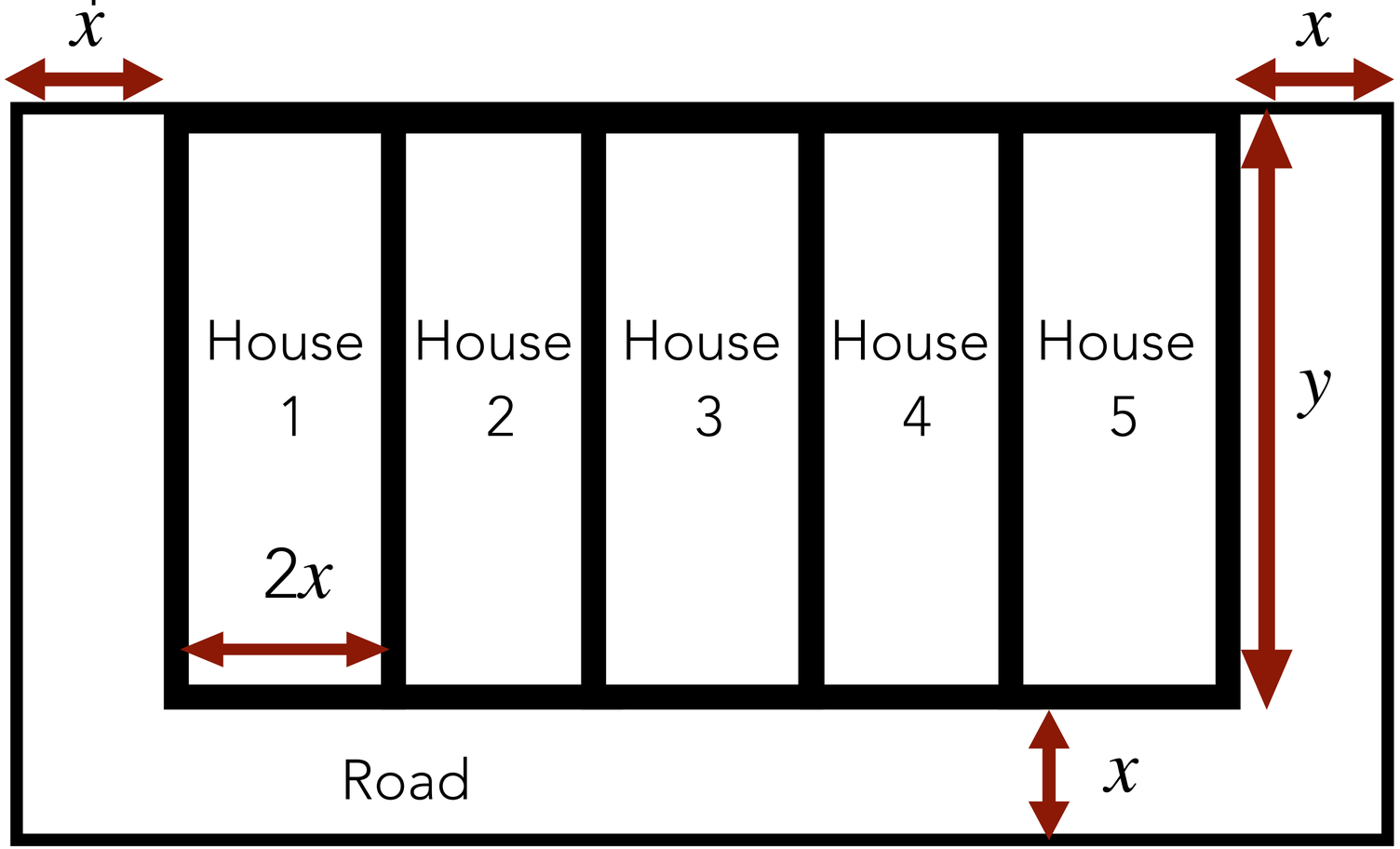
3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Example 9

Solving problem involving one linear equation and one non linear equation.

The diagram shows a plan of 5 terraced houses to be built on Encik Azman's land.

Example 9



The perimeter of the whole 5 houses is 160 metres. He allocated an area of 600 metre^2 to construct a road in front of the houses and on both sides of the end lot as in the above diagram. The width of the road is x metre.

Find the length and width, in metre, of each house. [6 marks]

SPMRSM 2019

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 9

Understanding the problem

- The perimeter of the whole 5 houses is 160 metres.
- area of 600 metre^2 to construct a road in front of the houses and on both sides of the end lot.
- Find the length and width of the house.

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

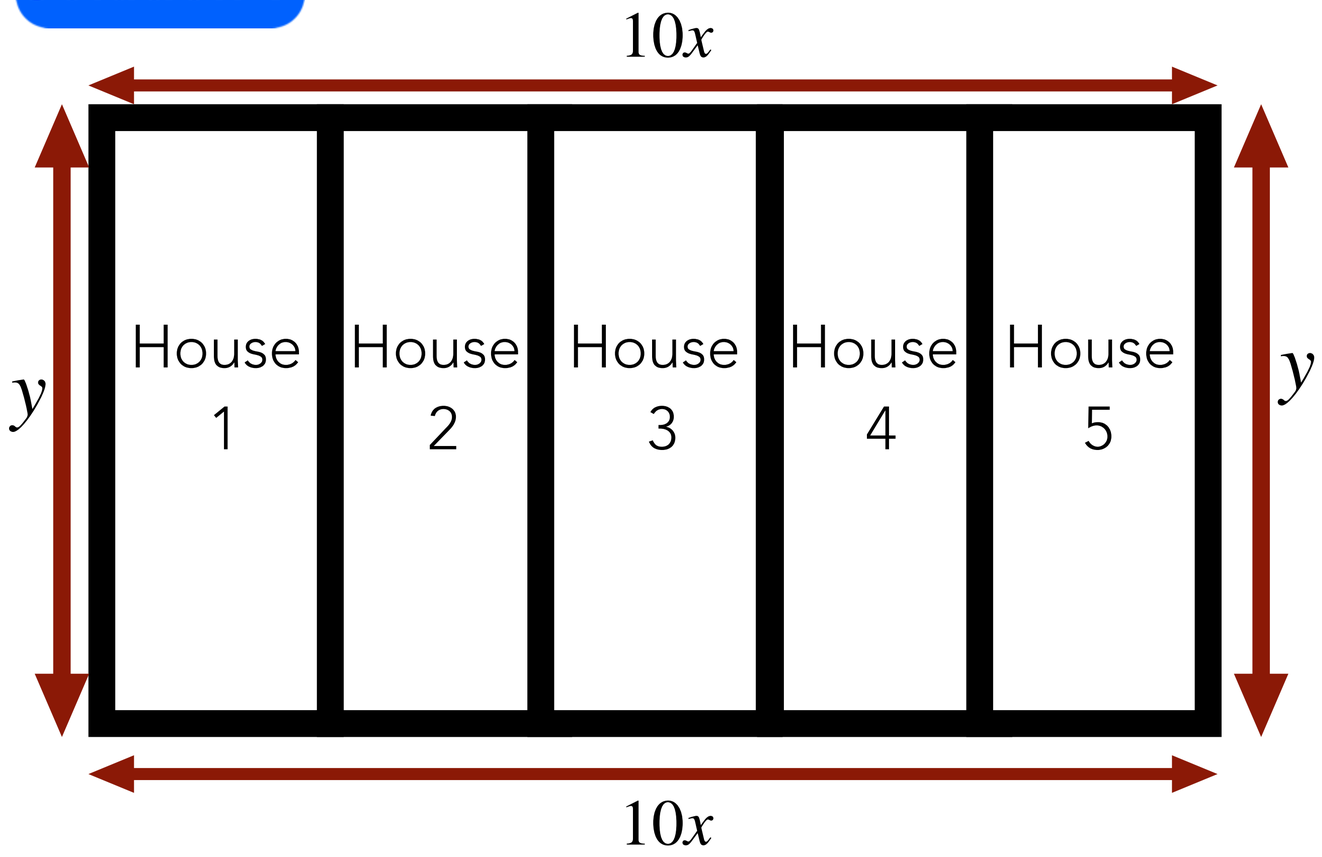
Solution 9

Planning strategy

- Form one linear equation and one non linear equation.
- Let the length of the house be $2x$ and its width be y.
- Using the method of substitution.

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 9



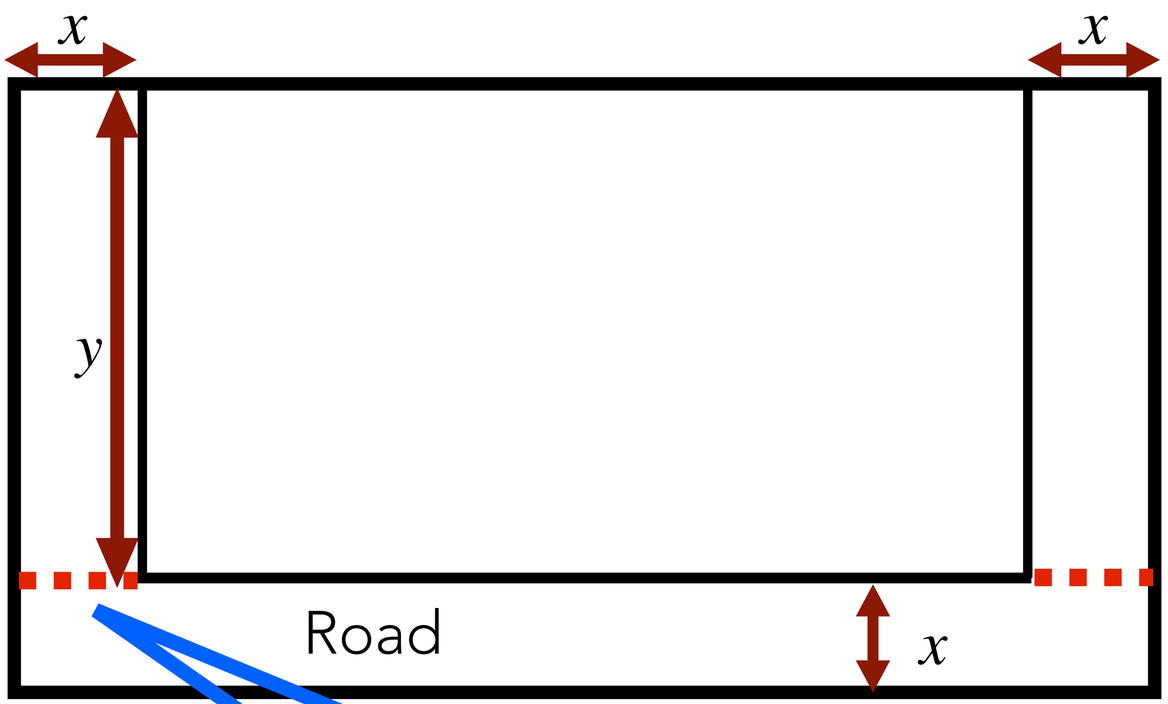
The perimeter of the whole five houses is 160 metres

$$10x + 10x + y + y = 160$$

$$10x + y = 80 \quad \text{—— 1}$$

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 9

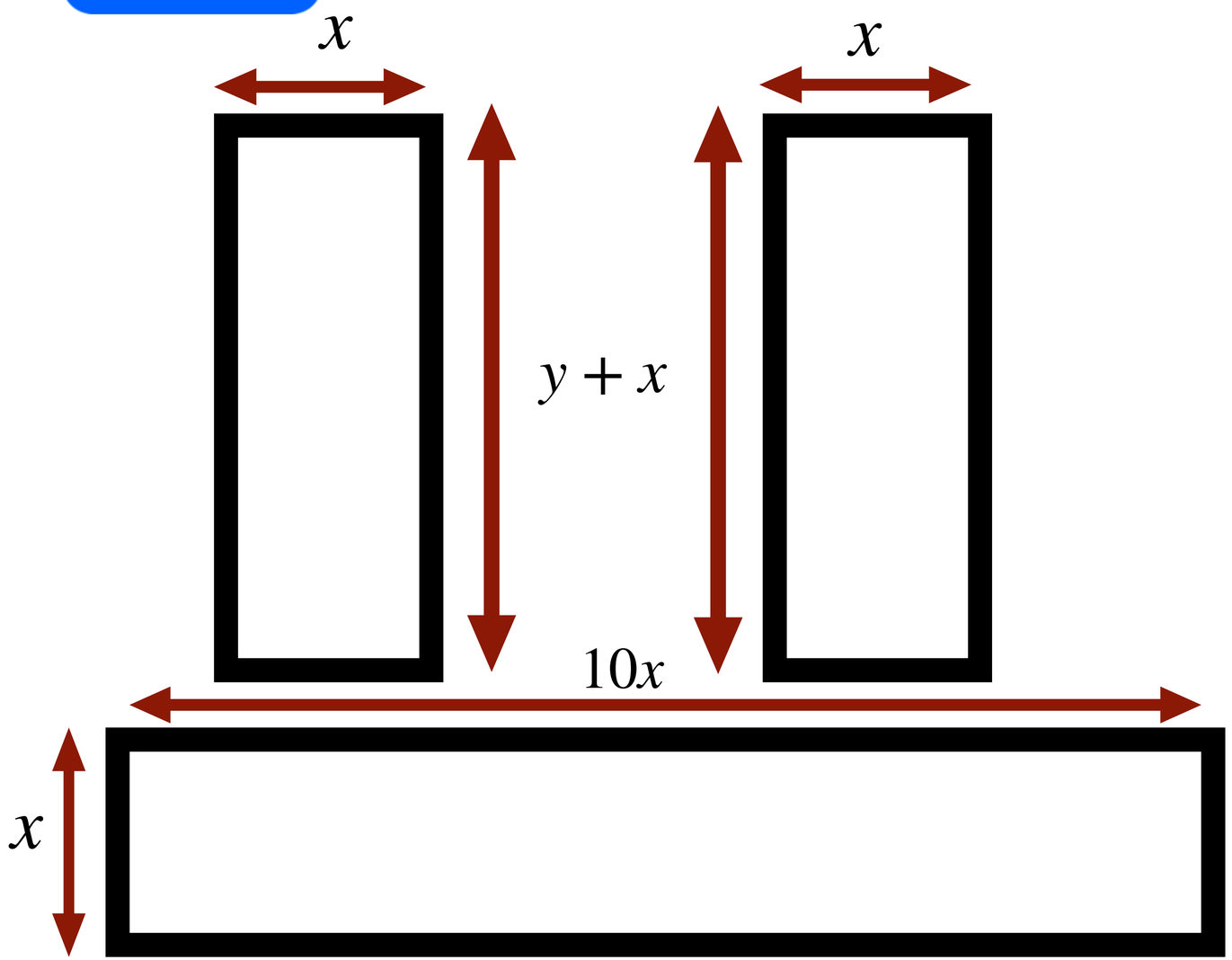


Divides the road into several parts

He allocated an **area of 600 metre^2** to construct a road in front of the houses and on both sides of the end lot

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 9



$$x(x+y)+x(x+y)+10x^2=600$$

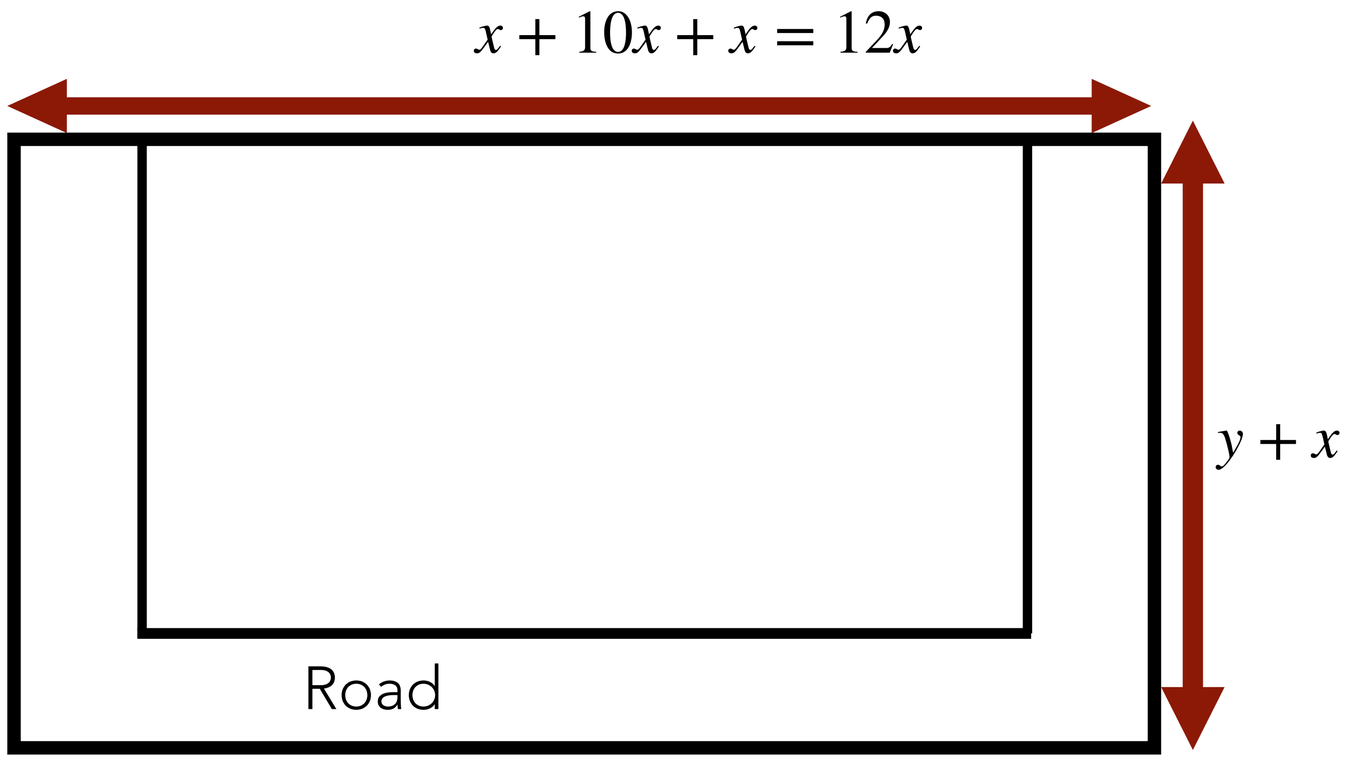
$$2x^2+2xy+10x^2=600$$

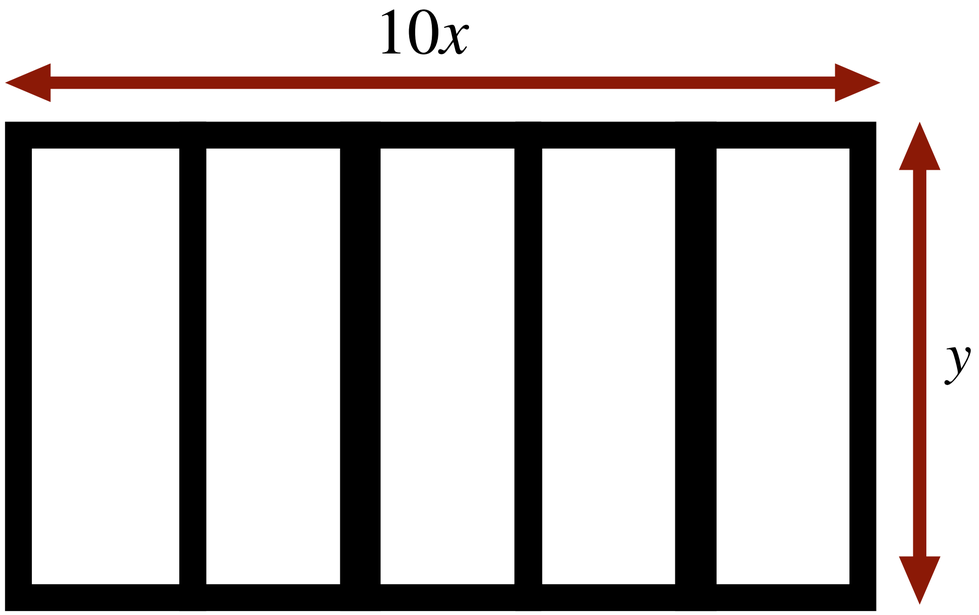
$$6x^2+xy=300 \quad \text{—— 2}$$

He allocated an **area of 600 metre²** to construct a road in front of the houses and on both sides of the end lot

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 9 (Alternative)





$$12x \times (y + x) - (10x \times y) = 600$$

$$12xy + 12x^2 - 10xy = 600$$

$$12x^2 + 2xy = 600$$

$$6x^2 + xy = 300 \quad \text{—— 2}$$

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 9

Implementing the strategy

$10x + y = 80$ —— 1 ✓ N1

$6x^2 + xy = 300$ —— 2

From 1, $y = 80 - 10x$ —— 3 ✓ P1

Substitute 3 in 2

$6x^2 + x(80 - 10x) = 300$ ✓ K1

$-4x^2 + 80x - 300 = 0$

$x^2 - 20x + 75 = 0$

$(x - 15)(x - 5) = 0$ ✓ K1

$x = 15\ ,\ x = 5$ ✓ N1

Substitute $x = 15\ ,\ x = 5$ in 3

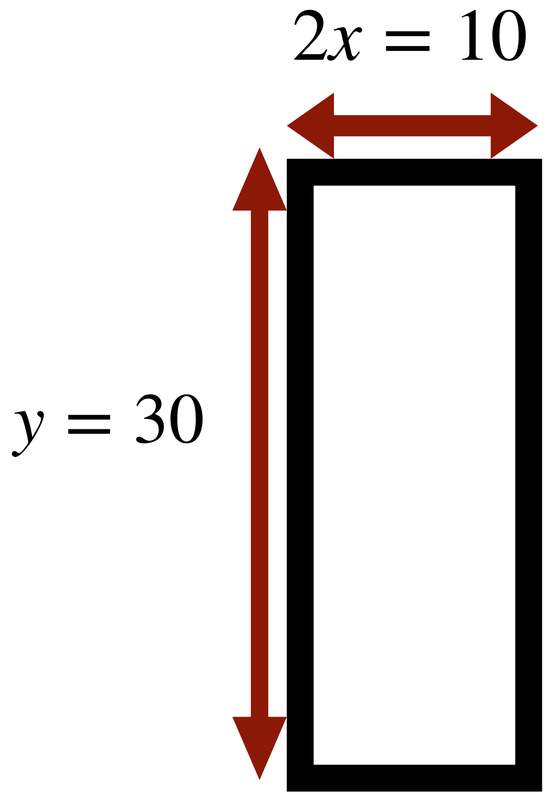
When $x = 15\ ,\quad y = 80 - 10(15) = -70$ **(ignored)**

When $x = 5\ ,\quad y = 80 - 10(5) = 30$ ✓ N1

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 9

Making conclusion



Length of the house is $10m$

Width of the house is $30m$

3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Example 10

Solve the following simultaneous equations using the graphical method :

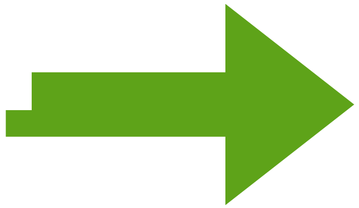
$$3x - 2y = 1$$

$$9x^2 + y = 7$$

Answer :

Step 1 :

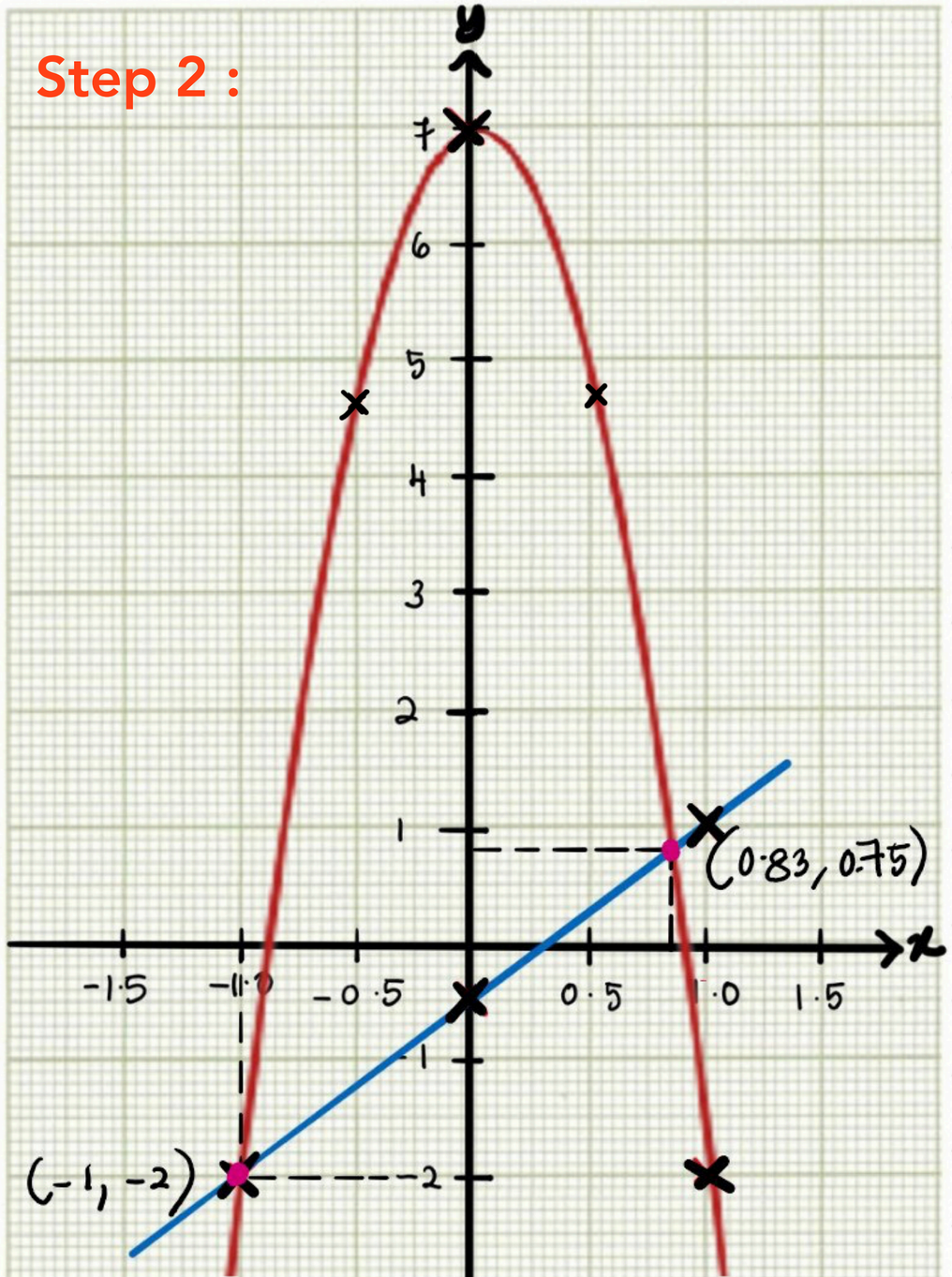
Value of x	-1	-0.5	0	0.5	1
Value of y in $3x - 2y = 1$	-2	-1.25	-0.5	0.25	1
Value of y in $9x^2 + y = 7$	-2	-4.75	7	-4.75	-2



3.2 Simultaneous Equations Involving One Linear Equation and One Non-Linear Equations

Solution 10

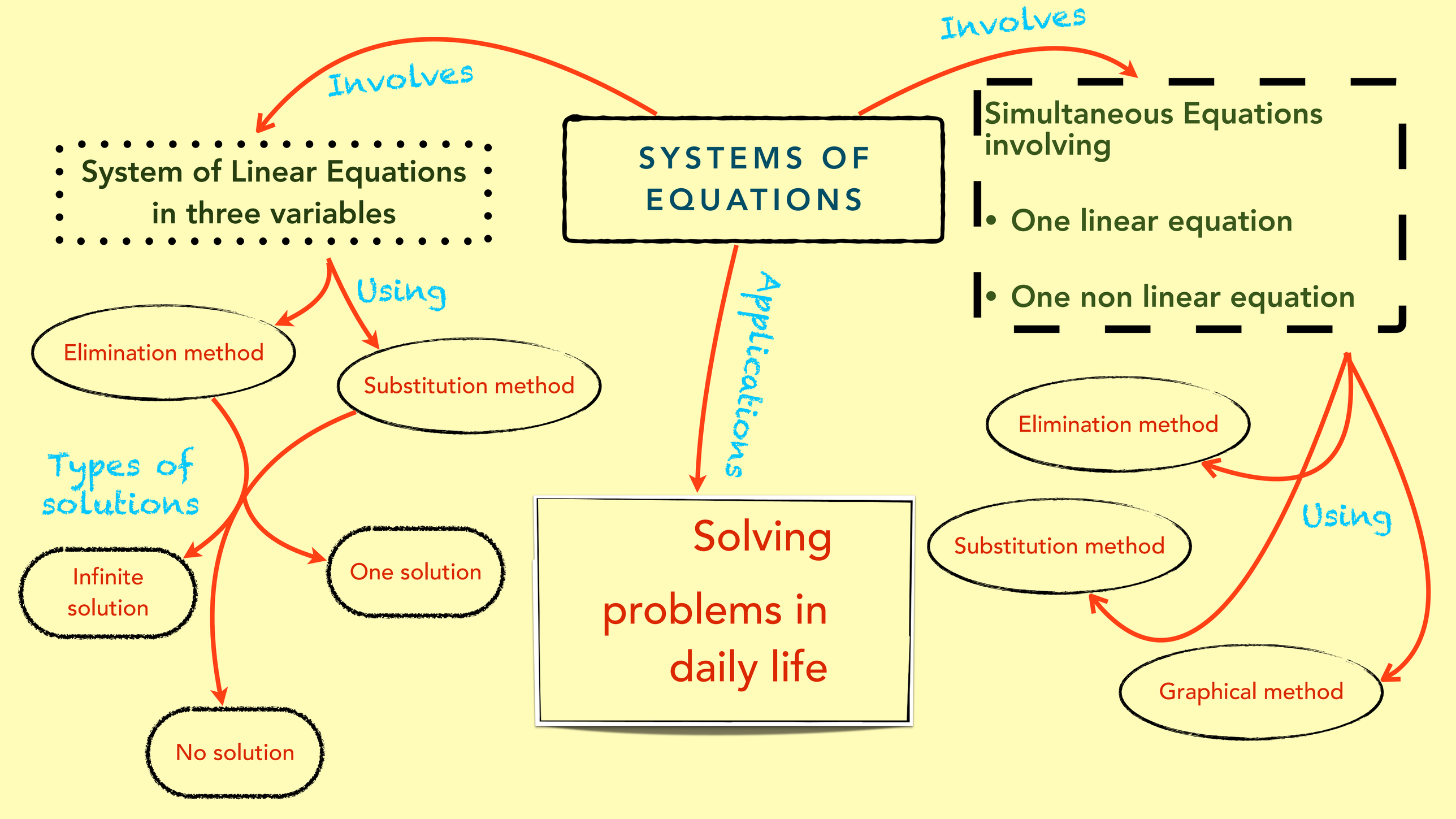
Step 2 :



Step 3 :

$x = -1$, $y = -2$

$x = 0.83$, $y = 0.75$


SYSTEMS OF EQUATIONS
Involves
System of Linear Equations in three variables
Using
Elimination method
Substitution method
Types of solutions
Infinite solution
One solution
No solution
Involves
Simultaneous Equations involving
• One linear equation
• One non linear equation
Using
Elimination method
Substitution method
Graphical method
Applications
Solving problems in daily life

THANK YOU.

Siri Skor A+ Matematik Tambahan

SPM 2021

JOM SKOR A+

22 Aug | 8.00 pm – 10.00 pm
Sahlawati Zakaria | MRSM Kuala Krai
Functions

27 Aug | 8.00 pm – 10.00 pm
Norlela Sapari | MRSM Taiping
Quadratic Functions

31 Aug | 8.00 pm – 10.00 pm
Khairulbariah Khairuddin | MRSM Mersing
Systems of Equations

4 Sept | 8.00 pm – 10.00 pm
Hazlina Ahmad | MRSM Alor Gajah
Indices, Surds and Logarithms

10 Sept | 8.00 pm – 10.00 pm
Hasniza Ismail | MRSM Parit
Progressions

16 Sept | 3.00 pm – 5.00 pm
Rosdiana Sarju | MRSM Johor Bahru
Linear Law

24 Sept | 8.00 pm – 10.00 pm
Dr. Jamilah Man | MRSM Langkawi
Coordinate Geometry

26 Sept | 8.00 pm – 10.00 pm
Mohd Faizi Mamat | MRSM Gemencheh
Vectors

1 Oct | 8.00 pm – 10.00 pm
Abdul Hadi Azmi | MRSM Pengkalan Chepa
Solution of Triangles

8 Oct | 8.00 pm – 10.00 pm
Noraini Ismail | MRSM Transkrian
Index Numbers

10 Oct | 8.00 pm – 10.00 pm
Hariani Abidin | MRSM Kuching
Circular Measure

15 Oct | 8.00 pm – 10.00 pm
Erwan Hazreen Musa | MRSM Bentong
Differentiation

14 Nov | 2.30 pm – 4.30 pm
Mohamad Fauzi Razak | MRSM Kepala Batas
Integration

20 Nov | 8.00 pm – 10.00 pm
Muhamad Baginda Zainuddin | MRSM Batu Pahat
Kinematics of Linear Motion

27 Nov | 2.30 pm – 4.30 pm
Haziq Syazwan Sajali | MRSM Tun Mustapha
Trigonometric Function

28 Nov | 3.00 pm – 5.00 pm
Suhaila Sulong | MRSM Tun Dr. Ismail
Permutation and Combination

3 Dis | 8.00 pm – 10.00 pm
Norhafizah Mohamed Yusoff | MRSM K. Terengganu
Probability Distribution

17 Dis | 8.00 pm – 10.00 pm
Asniza Arshad | MRSM Tun Ghaffar Baba
Linear Programming

Anjuran Unit Mate
Bahagian Pendidikan Menenga

Sesi webinar *live* melalui Microsoft Te