

Penyelesaian Lengkap

PRAKTIS 2

Praktis Formatif

2.1 Matriks Matrices

1

Bengkel Workshop	Myvi	Axia	Kancil
A	8	6	4
B	12	15	2
C	5	20	13

$$\begin{pmatrix} 8 & 6 & 4 \\ 12 & 15 & 2 \\ 5 & 20 & 13 \end{pmatrix}$$

2 (a) Bilangan baris = 2

Number of rows

(b) Bilangan lajur = 3

Number of columns

(c) Peringkat matriks = 2×3

Order of matrix

3 (a) Matriks lajur

Column matrix

(b) Matriks segi empat sama

Square matrix

(c) Matriks segi empat tepat

Rectangular matrix

(d) Matriks baris

Row matrix

4

Unsur/Elements Matriks/Matrices	a_{11}	a_{12}	a_{21}	a_{22}
$\begin{pmatrix} 2 & 9 \\ 1 & 12 \\ -7 & 14 \end{pmatrix}$	2	9	1	12
$\begin{pmatrix} -2 & 5 \\ 3 & -3 \end{pmatrix}$	-2	5	3	-3
$\begin{pmatrix} 6 & -5 & 3 \\ 4 & -8 & 0 \end{pmatrix}$	6	-5	4	-8
$\begin{pmatrix} -1 & 4 & 9 \\ 3 & 7 & -6 \\ 5 & 8 & 3 \end{pmatrix}$	-1	4	3	7

5 (a) $A \neq B$ sebab matriks A dan B tidak mempunyai peringkat yang sama. Peringkat matriks A adalah 3×1 manakala peringkat matriks B adalah 1×3 .

$A \neq B$ because matrices A and B do not have the same order. The order of matrix A is 3×1 whereas the order of matrix B is 1×3 .

(b) $A = B$ sebab kedua-dua matriks tersebut mempunyai peringkat yang sama dan setiap unsur sepadannya adalah sama.

$A = B$ because both the matrices have the same order and each corresponding element is equal.

(c) $A \neq B$ sebab setiap unsur sepadannya adalah berlainan. Contohnya, $a_{22} = 3$ tetapi $b_{22} = 1$.

$A \neq B$ because each corresponding element is different. For example, $a_{22} = 3$ but $b_{22} = 1$.

$$6 \begin{pmatrix} -3r + 5t & 4 \\ 7 & -1 \end{pmatrix} = \begin{pmatrix} -2 & 4 \\ 7 & -r + \frac{5t}{4} \end{pmatrix}$$

Secara perbandingan/By comparison,

$$-3r + 5t = -2 \dots\dots ①$$

$$-r + \frac{5t}{4} = -1 \dots\dots ②$$

Dari/From ②:

$$3 \times \left(-r + \frac{5t}{4} \right) = 3 \times (-1)$$

$$-3r + \frac{15t}{4} = -3 \dots\dots ③$$

① - ③:

$$5t - \frac{15t}{4} = 1$$

$$1.25t = 1$$

$$t = 0.8$$

Gantikan $t = 0.8$ ke dalam persamaan ①.

Substitute $t = 0.8$ into equation ①.

$$-3r + (5 \times 0.8) = -2$$

$$-3r = -6$$

$$r = 2$$

$$\therefore r = 2, t = 0.8$$

2.2 Operasi Asas Matriks

Basic Operation on Matrices

1 (a) Tidak, kerana peringkat matriks pertama ialah 2×2 tetapi peringkat matriks kedua ialah 2×1 , iaitu kedua-dua matriks tidak mempunyai peringkat yang sama.

No because the order of the first matrix is 2×2 but the order of the second matrix is 2×1 , i.e. the two matrices do not have the same order.

(b) Ya, kerana kedua-dua matriks mempunyai peringkat yang sama, iaitu 2×3 .

Yes, because both matrices have the same order, i.e. 2×3 .

$$2 \text{ (a) } \begin{pmatrix} 3 & 5 & 4 \end{pmatrix} - \begin{pmatrix} 2 & -10 & 6 \end{pmatrix} = \begin{pmatrix} 1 & 15 & -2 \end{pmatrix}$$

$$\text{(b) } \begin{pmatrix} 9 & 6 \\ 7 & 3 \end{pmatrix} + \begin{pmatrix} 3 & 4 \\ 8 & 2 \end{pmatrix} - \begin{pmatrix} 9 & 8 \\ 9 & 1 \end{pmatrix} = \begin{pmatrix} 3 & 2 \\ 6 & 4 \end{pmatrix}$$

$$3 \text{ (a) } \begin{pmatrix} 1 & 2 & 3 \end{pmatrix} + \begin{pmatrix} 4 & 5 & 6 \end{pmatrix} - \begin{pmatrix} 7 & 8 & 9 \end{pmatrix} = \begin{pmatrix} 2p-3q & -1 & q \end{pmatrix}$$

$$q = 3 + 6 - 9$$

$$= 0$$

$$2p - 3q = -2$$

$$2p = -2$$

$$p = -1$$

$$\therefore p = -1, q = 0$$

$$\text{(b) } \begin{pmatrix} p & 2 \\ 9 & q \end{pmatrix} - \begin{pmatrix} -3 & -4 \\ 4 & -1 \end{pmatrix} = \begin{pmatrix} q & 6 \\ 5 & 2p \end{pmatrix}$$

$$\begin{pmatrix} p - (-3) & 2 - (-4) \\ 9 - 4 & q - (-1) \end{pmatrix} = \begin{pmatrix} q & 6 \\ 5 & 2p \end{pmatrix}$$

$$\begin{pmatrix} p+3 & 6 \\ 5 & q+1 \end{pmatrix} = \begin{pmatrix} q & 6 \\ 5 & 2p \end{pmatrix}$$

$$p+3 = q \quad \dots(1)$$

$$q+1 = 2p \quad \dots(2)$$

Gantikan /Substitute (1) ke dalam/into (2)

$$p+3+1 = 2p$$

$$p = 4$$

Gantikan/Substitute $p = 4$ ke dalam/into (1)

$$4+3 = q$$

$$q = 7$$

$$\therefore p = 4, q = 7$$

$$4 \text{ } F - \begin{pmatrix} -2 & 1 & 5 \\ 4 & 0 & 7 \\ 6 & -3 & 0 \end{pmatrix} = \begin{pmatrix} 4 & 6 & 3 \\ 2 & 1 & -5 \\ 1 & -3 & 1 \end{pmatrix}$$

$$F = \begin{pmatrix} 4 & 6 & 3 \\ 2 & 1 & -5 \\ 1 & -3 & 1 \end{pmatrix} + \begin{pmatrix} -2 & 1 & 5 \\ 4 & 0 & 7 \\ 6 & -3 & 0 \end{pmatrix}$$

$$= \begin{pmatrix} 2 & 7 & 8 \\ 6 & 1 & 2 \\ 7 & -6 & 1 \end{pmatrix}$$

$$5 \text{ } 2 \begin{pmatrix} -3 & -2 \\ 4 & 5 \end{pmatrix} + \frac{1}{3} \begin{pmatrix} 3 & -6 \\ -9 & 12 \end{pmatrix}$$

$$= \begin{pmatrix} 2 \times (-3) & 2 \times (-2) \\ 2 \times 4 & 2 \times 5 \end{pmatrix} + \begin{pmatrix} \frac{1}{3} \times 3 & \frac{1}{3} \times (-6) \\ \frac{1}{3} \times (-9) & \frac{1}{3} \times 12 \end{pmatrix}$$

$$= \begin{pmatrix} -6 & -4 \\ 8 & 10 \end{pmatrix} + \begin{pmatrix} 1 & -2 \\ -3 & 4 \end{pmatrix}$$

$$= \begin{pmatrix} -5 & -6 \\ 5 & 14 \end{pmatrix}$$

$$6 \text{ (a) } 12k = 4$$

$$k = \frac{1}{3}$$

$$\text{(b) } -20k = -4$$

$$k = \frac{1}{5}$$

$$7 \text{ } \frac{1}{2} \begin{pmatrix} 6 & 4a \\ 12 & 8b \end{pmatrix} - 3 \begin{pmatrix} 2 & b \\ -1 & -a \end{pmatrix} = \begin{pmatrix} -3 & 9 \\ 9 & 5 \end{pmatrix}$$

$$\begin{pmatrix} 3 & 2a \\ 6 & 4b \end{pmatrix} - \begin{pmatrix} 6 & 3b \\ -3 & -3a \end{pmatrix} = \begin{pmatrix} -3 & 9 \\ 9 & 5 \end{pmatrix}$$

$$\begin{pmatrix} -3 & 2a-3b \\ 9 & 4b+3a \end{pmatrix} = \begin{pmatrix} -3 & 9 \\ 9 & 5 \end{pmatrix}$$

$$2a - 3b = 9 \quad \dots(1)$$

$$4b + 3a = 5 \quad \dots(2)$$

$$(1) \times 3: \quad 6a - 9b = 27 \quad \dots(3)$$

$$(2) \times 2: \quad (-) \quad 6a + 8b = 10 \quad \dots(4)$$

$$\quad \quad \quad -17b = 17$$

$$b = -1$$

Gantikan $b = -1$ ke dalam (1)

Substitute $b = -1$ into (1)

$$2a - 3(-1) = 9$$

$$2a = 6$$

$$a = 3$$

$$8 \text{ } A + \begin{pmatrix} 3 & -2 \\ -4 & 7 \end{pmatrix} = \begin{pmatrix} 15 & 16 \\ 17 & 22 \end{pmatrix} - 2A$$

$$A + 2A = \begin{pmatrix} 15 & 16 \\ 17 & 22 \end{pmatrix} - \begin{pmatrix} 3 & -2 \\ -4 & 7 \end{pmatrix}$$

$$3A = \begin{pmatrix} 12 & 18 \\ 21 & 15 \end{pmatrix}$$

$$A = \frac{1}{3} \begin{pmatrix} 12 & 18 \\ 21 & 15 \end{pmatrix}$$

$$A = \begin{pmatrix} 4 & 6 \\ 7 & 5 \end{pmatrix}$$

$$9 \text{ (a) } \begin{pmatrix} 1 & -3 & 5 \\ -7 & 9 & -10 \end{pmatrix} \begin{pmatrix} 2 & -3 & 1 \\ 5 & 6 & -8 \\ -1 & 4 & 10 \end{pmatrix}$$

$$\begin{matrix} [2 \times 3] & & [3 \times 3] \\ & \uparrow & \uparrow \\ & \boxed{=} & \end{matrix}$$

Maka, kedua-dua matriks **boleh** didarab.

Hence, both matrices **can** be multiplied.

$$\text{(b) } \begin{pmatrix} 2 & -5 & 8 \\ -6 & 8 & -9 \end{pmatrix} \begin{pmatrix} 2 & -2 & 4 \\ -6 & 8 & -9 \end{pmatrix}$$

$$\begin{matrix} [1 \times 3] & & [2 \times 3] \\ & \uparrow & \uparrow \\ & \boxed{\neq} & \end{matrix}$$

Maka, kedua-dua matriks **tidak boleh** didarab.

Hence, both matrices **cannot** be multiplied.

$$10 \text{ (a) } \begin{pmatrix} -3 \\ 4 \end{pmatrix} \begin{pmatrix} -2 & -1 \end{pmatrix}$$

$$\begin{matrix} [2 \times 1] & [1 \times 2] \\ & \uparrow & \uparrow \\ & \boxed{=} \\ & \boxed{2 \times 2} \end{matrix}$$

Maka, peringkat matriks yang terhasil ialah 2×2 .

Thus, the order of the matrix produced is 2×2 .

$$= \begin{pmatrix} -3 \times (-2) & -3 \times (-1) \\ 4 \times (-2) & 4 \times (-1) \end{pmatrix}$$

$$= \begin{pmatrix} 6 & 3 \\ -8 & -4 \end{pmatrix}$$

$$(b) \begin{pmatrix} 5 & 2 & 3 \\ 6 & 3 & 7 \end{pmatrix} \begin{pmatrix} -4 \\ -2 \\ -1 \end{pmatrix}$$

Maka, peringkat matriks yang terhasil ialah 2×1 .
Thus, the order of the matrix produced is 2×1 .

$$= \begin{pmatrix} 5 \times (-4) + 2 \times (-2) + 3 \times (-1) \\ 6 \times (-4) + 3 \times (-2) + 7 \times (-1) \end{pmatrix}$$

$$= \begin{pmatrix} -27 \\ -37 \end{pmatrix}$$

$$11 (a) A^2 = \begin{pmatrix} -1 & 2 \\ -3 & 4 \end{pmatrix} \begin{pmatrix} -1 & 2 \\ -3 & 4 \end{pmatrix}$$

$$= \begin{pmatrix} -1 \times (-1) + 2 \times (-3) & (-1) \times 2 + 2 \times 4 \\ -3 \times (-1) + 4 \times (-3) & (-3) \times 2 + 4 \times 4 \end{pmatrix}$$

$$= \begin{pmatrix} -5 & 6 \\ -9 & 10 \end{pmatrix}$$

$$(b) A^3 = A^2 A$$

$$A^3 = \begin{pmatrix} -5 & 6 \\ -9 & 10 \end{pmatrix} \begin{pmatrix} -1 & 2 \\ -3 & 4 \end{pmatrix}$$

$$= \begin{pmatrix} -5 \times (-1) + 6 \times (-3) & (-5) \times 2 + 6 \times 4 \\ -9 \times (-1) + 10 \times (-3) & (-9) \times 2 + 10 \times 4 \end{pmatrix}$$

$$= \begin{pmatrix} -13 & 14 \\ -21 & 22 \end{pmatrix}$$

$$12 \quad \begin{pmatrix} p & 3 \end{pmatrix} \begin{pmatrix} -3 & 1 \\ 2 & q \end{pmatrix} = \begin{pmatrix} -18 & 23 \end{pmatrix}$$

$$\begin{pmatrix} p \times (-3) + 3 \times 2 & p \times 1 + 3 \times q \end{pmatrix} = \begin{pmatrix} -18 & 23 \end{pmatrix}$$

$$\begin{pmatrix} -3p + 6 & p + 3q \end{pmatrix} = \begin{pmatrix} -18 & 23 \end{pmatrix}$$

$$\begin{aligned} -3p + 6 &= -18 \\ -3p &= -24 \\ p &= 8 \\ p + 3q &= 23 \\ 8 + 3q &= 23 \\ 3q &= 15 \\ q &= 5 \\ p - q &= 8 - 5 \\ &= 3 \end{aligned}$$

$$13 \quad AB = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix}$$

$$= \begin{pmatrix} 1 \times 5 + 2 \times 7 & 1 \times 6 + 2 \times 8 \\ 3 \times 5 + 4 \times 7 & 3 \times 6 + 4 \times 8 \end{pmatrix}$$

$$= \begin{pmatrix} 19 & 22 \\ 43 & 50 \end{pmatrix}$$

$$BA = \begin{pmatrix} 5 & 6 \\ 7 & 8 \end{pmatrix} \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

$$= \begin{pmatrix} 5 \times 1 + 6 \times 3 & 5 \times 2 + 6 \times 4 \\ 7 \times 1 + 8 \times 3 & 7 \times 2 + 8 \times 4 \end{pmatrix}$$

$$= \begin{pmatrix} 23 & 34 \\ 31 & 46 \end{pmatrix}$$

Maka/Hence $AB \neq BA$

$$14 (a) \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} = \begin{pmatrix} 3 & 1 \\ 4 & 2 \end{pmatrix}$$

$$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} = \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$$

Hasil darab tidak menghasilkan matriks yang sama dengan matriks yang asal iaitu $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$.

Maka $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ bukan matriks identiti.

The product does not produce the original matrix that is $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$. Hence,

$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ is not an identity matrix.

$$(b) \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$$

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix} = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$$

Hasil darab menghasilkan matriks yang sama dengan matriks yang asal iaitu $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$. Maka

$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ ialah matriks identiti.

The product produces the original matrix that is

$\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$. Hence, $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ is an identity matrix.

$$15 (a) \begin{pmatrix} -2 & 7 \\ 8 & 6 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} + 2I \begin{pmatrix} -2 & 7 \\ 8 & 6 \end{pmatrix}$$

$$= \begin{pmatrix} -2 & 7 \\ 8 & 6 \end{pmatrix} + 2 \begin{pmatrix} -2 & 7 \\ 8 & 6 \end{pmatrix}$$

$$= \begin{pmatrix} -2 & 7 \\ 8 & 6 \end{pmatrix} + \begin{pmatrix} -4 & 14 \\ 16 & 12 \end{pmatrix}$$

$$= \begin{pmatrix} -6 & 21 \\ 24 & 18 \end{pmatrix}$$

$$(b) \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 2 & 7 \\ 3 & 4 & 8 \\ 5 & 6 & 9 \end{pmatrix} - 3 \begin{pmatrix} -2 & 1 & 0 \\ 0 & -1 & 0 \\ 3 & 0 & 2 \end{pmatrix} I$$

$$= \begin{pmatrix} 1 & 2 & 7 \\ 3 & 4 & 8 \\ 5 & 6 & 9 \end{pmatrix} - \begin{pmatrix} -6 & 3 & 0 \\ 0 & -3 & 0 \\ 9 & 0 & 6 \end{pmatrix}$$

$$= \begin{pmatrix} 7 & -1 & 7 \\ 3 & 7 & 8 \\ -4 & 6 & 3 \end{pmatrix}$$

$$16 \quad \begin{pmatrix} p & -3 \\ 6 & q \end{pmatrix} = 3 \begin{pmatrix} 3 & r \\ s & 4 \end{pmatrix} - 4 \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\begin{pmatrix} p & -3 \\ 6 & q \end{pmatrix} = \begin{pmatrix} 9 & 3r \\ 3s & 12 \end{pmatrix} - \begin{pmatrix} 4 & 0 \\ 0 & 4 \end{pmatrix}$$

$$\begin{pmatrix} p & -3 \\ 6 & q \end{pmatrix} = \begin{pmatrix} 5 & 3r \\ 3s & 8 \end{pmatrix}$$

Secara perbandingan/By comparison,

$$p = 5,$$

$$q = 8,$$

$$3r = -3, r = -1$$

$$3s = 6, s = 2$$

$$17 \quad (a) \quad A^2 = \begin{pmatrix} 0 & 1 \\ 2 & 3 \end{pmatrix} \begin{pmatrix} 0 & 1 \\ 2 & 3 \end{pmatrix} \\ = \begin{pmatrix} 2 & 3 \\ 6 & 11 \end{pmatrix}$$

$$(b) \quad I^3 A = IA \\ = A \\ = \begin{pmatrix} 0 & 1 \\ 2 & 3 \end{pmatrix}$$

$$(c) \quad A^2 I^2 = A^2 I \\ = A^2 \\ = \begin{pmatrix} 2 & 3 \\ 6 & 11 \end{pmatrix}$$

$$18 \quad A^{-1} = \frac{1}{(-1)(-3) - (2)(4)} \begin{pmatrix} -3 & -2 \\ -4 & -1 \end{pmatrix} \\ = \frac{1}{-5} \begin{pmatrix} -3 & -2 \\ -4 & -1 \end{pmatrix} \\ = \begin{pmatrix} \frac{3}{5} & \frac{2}{5} \\ \frac{4}{5} & \frac{1}{5} \end{pmatrix}$$

19 (a) Jika matriks $P = \begin{pmatrix} 3k & 6 \\ 4 & -1 \end{pmatrix}$ tidak mempunyai

songsang, maka penentunya = 0.

If matrix $P = \begin{pmatrix} 3k & 6 \\ 4 & -1 \end{pmatrix}$ does not have an inverse

matrix, then its determinant = 0.

$$(3k)(-1) - (6)(4) = 0$$

$$-3k - 24 = 0$$

$$-3k = 24$$

$$k = -8$$

(b) Jika/If $Q = \begin{pmatrix} 8 & a \\ -5 & 3 \end{pmatrix}$, maka/then

$$Q^{-1} = \frac{1}{(8)(3) - (a)(-5)} \begin{pmatrix} 3 & -a \\ 5 & 8 \end{pmatrix}.$$

Diberi/Given $Q^{-1} = -\frac{1}{6} \begin{pmatrix} 3 & -a \\ b+2 & 8 \end{pmatrix}$, maka/then

$$\frac{1}{(8)(3) - (a)(-5)} = -\frac{1}{6} \text{ dan /and } b+2 = 5$$

$$24 + 5a = -6$$

$$5a = -30$$

$$a = -6$$

$$20 \quad \begin{pmatrix} 2 & -3 \\ 4 & -5 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 12 \\ 22 \end{pmatrix}$$

Katakan/Let $A = \begin{pmatrix} 2 & -3 \\ 4 & -5 \end{pmatrix}$

$$A^{-1} = \frac{1}{2(-5) - (-3)(4)} \begin{pmatrix} -5 & 3 \\ -4 & 2 \end{pmatrix}$$

$$= \frac{1}{2} \begin{pmatrix} -5 & 3 \\ -4 & 2 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = A^{-1} \begin{pmatrix} 12 \\ 22 \end{pmatrix}$$

$$= \frac{1}{2} \begin{pmatrix} -5 & 3 \\ -4 & 2 \end{pmatrix} \begin{pmatrix} 12 \\ 22 \end{pmatrix}$$

$$= \frac{1}{2} \begin{pmatrix} 6 \\ -4 \end{pmatrix}$$

$$= \begin{pmatrix} 3 \\ -2 \end{pmatrix}$$

21 (a) Matriks songsang bagi $\begin{pmatrix} 5 & -2 \\ -6 & 3 \end{pmatrix}$ ialah

$$\frac{1}{5(3) - (-2)(-6)} \begin{pmatrix} 3 & 2 \\ 6 & 5 \end{pmatrix}, \text{ iaitu } \frac{1}{3} \begin{pmatrix} 3 & 2 \\ 6 & 5 \end{pmatrix}.$$

The inverse matrix of $\begin{pmatrix} 5 & -2 \\ -6 & 3 \end{pmatrix}$ is

$$\frac{1}{5(3) - (-2)(-6)} \begin{pmatrix} 3 & 2 \\ 6 & 5 \end{pmatrix}, \text{ i.e. } \frac{1}{3} \begin{pmatrix} 3 & 2 \\ 6 & 5 \end{pmatrix}.$$

Seterusnya, secara perbandingan/Hence, by comparison,

$$r = 3, p = 6 \text{ and } q = 5.$$

$$(b) \quad 5x - 2y - 3 = 0$$

$$-6x + 3y - 9 = 0$$

$$5x - 2y = 3$$

$$-6x + 3y = 9$$

Persamaan matriks ialah/The matrix equation is

$$\begin{pmatrix} 5 & -2 \\ -6 & 3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ 9 \end{pmatrix}$$

Katakan/let A

$$\begin{pmatrix} x \\ y \end{pmatrix} = A^{-1} \begin{pmatrix} 3 \\ 9 \end{pmatrix}$$

$$= \frac{1}{3} \begin{pmatrix} 3 & 2 \\ 6 & 5 \end{pmatrix} \begin{pmatrix} 3 \\ 9 \end{pmatrix}$$

$$= \frac{1}{3} \begin{pmatrix} 27 \\ 63 \end{pmatrix}$$

$$= \begin{pmatrix} 9 \\ 21 \end{pmatrix}$$

$$\therefore x = 9, y = 21$$

$$22 \quad (a) \quad 3x + 2y = 9 \quad \dots(1)$$

$$5x + 4y = 16 \quad \dots(2)$$

Persamaan matriks ialah/ The matrix equation is

$$\begin{pmatrix} 3 & 2 \\ 5 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 9 \\ 16 \end{pmatrix}$$

Andaikan matriks A
Assume matrix A

$$A^{-1} = \frac{1}{3(4) - 2(5)} \begin{pmatrix} 4 & -2 \\ -5 & 3 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = A^{-1} \begin{pmatrix} 9 \\ 16 \end{pmatrix} \leftarrow A^{-1}A \begin{pmatrix} x \\ y \end{pmatrix} = A^{-1} \begin{pmatrix} 9 \\ 16 \end{pmatrix}$$

$$I \begin{pmatrix} x \\ y \end{pmatrix} = A^{-1} \begin{pmatrix} 9 \\ 16 \end{pmatrix}$$

$$\therefore \begin{pmatrix} x \\ y \end{pmatrix} = A^{-1} \begin{pmatrix} 9 \\ 16 \end{pmatrix}$$

$$= \begin{pmatrix} 2 & -1 \\ -5 & 3 \end{pmatrix} \begin{pmatrix} 9 \\ 16 \end{pmatrix}$$

$$= \begin{pmatrix} 2 \\ 1.5 \end{pmatrix}$$

Maka, harga sebatang pen gel dan sebatang pen mata bulat masing-masing ialah RM2 dan RM1.50.
Hence, the prices of a gel pen and a ballpoint pen are RM2 and RM1.50 respectively.

Praktis Sumatif

Kertas 1

- 1 C 2 B 3 D 4 B 5 A
6 A 7 C 8 D 9 B 10 B

Kertas 2

Bahagian/Section A

- 1 (a) $A - (6a - 3b) = (-2a - 9b)$
 $A = (-2a - 9b) + (6a - 3b)$
 $= (4a - 12b)$
- (b) $\begin{pmatrix} -2 & 3 \\ 6 & 4 \end{pmatrix} - A = \begin{pmatrix} 4 & 1 \\ 5 & -2 \end{pmatrix}$
 $A = \begin{pmatrix} -2 & 3 \\ 6 & 4 \end{pmatrix} - \begin{pmatrix} 4 & 1 \\ 5 & -2 \end{pmatrix}$
 $= \begin{pmatrix} -6 & 2 \\ 1 & 6 \end{pmatrix}$
- 2 (a) $AB = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix} \begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$
 $= \begin{pmatrix} 4 & 10 \\ 10 & 24 \end{pmatrix}$
- (b) Tidak. Apabila matriks A ialah matriks songsang bagi matriks B dan sebaliknya, maka $AB = BA = I$ atau $AI = IA = A$
 No. When matrix A is the inverse matrix of matrix B and vice versa, then $AB = BA = I$ or $AI = IA = A$

3 $C = AI^2 + 2B$
 $= A + 2B$
 $= \begin{pmatrix} 4 & 3 \\ -2 & 5 \end{pmatrix} + 2 \begin{pmatrix} 6 & 2 \\ -1 & 7 \end{pmatrix}$
 $= \begin{pmatrix} 4 & 3 \\ -2 & 5 \end{pmatrix} + \begin{pmatrix} 12 & 4 \\ -2 & 14 \end{pmatrix}$
 $= \begin{pmatrix} 16 & 7 \\ -4 & 19 \end{pmatrix}$

4 (a) $6(-3) - 2(-x) = 0$
 $2x = 18$
 $x = 9$

(b) $-2(-14) - 2(x - 1) = 0$
 $28 - 2x + 2 = 0$
 $2x = 30$
 $x = 15$

5 $A = \begin{pmatrix} a & b \\ -1 & 3 \end{pmatrix}$

$$A^{-1} = \frac{1}{c} \begin{pmatrix} d & -1 \\ 1 & -2 \end{pmatrix} = \frac{1}{3a+b} \begin{pmatrix} 3 & -b \\ 1 & a \end{pmatrix}$$

Secara perbandingan/By comparison

$$a = -2, b = 1,$$

$$c = 3a + b$$

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

$$= -5$$

$$d = 3$$

6 (a) $3x + 2y = 23.50$
 $5x + 6y = 48.50$

(b) $\begin{pmatrix} 3 & 2 \\ 5 & 6 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 23.50 \\ 48.50 \end{pmatrix}$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{3(6) - 2(5)} \begin{pmatrix} 6 & -2 \\ -5 & 3 \end{pmatrix} \begin{pmatrix} 23.50 \\ 48.50 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{8} \begin{pmatrix} 44 \\ 28 \end{pmatrix}$$

$$\therefore x = 5.50, y = 3.50$$

7 (a) $x + y = 7$
 $12x + 13y = 88$

(b) $\begin{pmatrix} 1 & 1 \\ 12 & 13 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 7 \\ 88 \end{pmatrix}$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \frac{1}{1(13) - 1(12)} \begin{pmatrix} 13 & -1 \\ -12 & 1 \end{pmatrix} \begin{pmatrix} 7 \\ 88 \end{pmatrix}$$

$$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$$

$$\therefore x = 3, y = 4$$