Penyelesaian Lengkap

Praktis 2

Praktis Formatif

2.1 Matriks
Matrices

1

Kilang *Factory*	Vietnam *Vietnamese*	Indonesia *Indonesian*	Nepal *Nepalese*
A	24	12	9
B	11	8	15

$\begin{pmatrix} 24 & 12 & 9 \\ 11 & 8 & 15 \end{pmatrix}$

2 (a) Bilangan baris matriks $D = 3$
Number of rows of matrix D = **3**
(b) Bilangan lajur matriks $D = 3$
Number of columns of matrix D = **3**
(c) Peringkat matriks $D = 3 \times 3$
Order of matrix D $= 3 \times 3$
(d) Matriks segi empat sama
Square matrix

3 (a) Matriks lajur
Column matrix
(b) Matriks baris
Row matrix
(c) Matriks segi empat tepat
Rectangular matrix
(d) Matriks segi empat sama
Square matrix

4

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

5 $\begin{pmatrix} x+2y & 9 \\ 6 & -x-y \end{pmatrix} = \begin{pmatrix} 5 & 9 \\ 6 & -3 \end{pmatrix}$
Secara perbandingan/*By comparison*,
$x + 2y = 5$ ...(1)
$-x - y = -3$ ...(2)
Dari/*From*(2):
$-(x + y) = -3$
$x + y = 3$ ...(3)
(1) – (3): $y = 2$
Gantikan $y = 2$ ke dalam (1).
Substitute $y = 2$ *into* (1).
$x + 2(2) = 5$
$x = 1$
$\therefore x = 1, y = 2$

6 (a) $\begin{pmatrix} -3 & 2q+1 \\ 3r+4 & -2 \end{pmatrix} = \begin{pmatrix} -p & 11 \\ -11 & -2 \end{pmatrix}$
$p = 3$
$2q + 1 = 11$
$2q = 10$
$q = 5$
$3r + 4 = -11$
$3r = -15$
$r = -5$
(b) $(r + p \quad q \quad -2p - 1) = (-4 \quad -5 \quad r)$
$q = -5$
$-2p - 1 = r$
$r + 2p = -1$ ...(1)
$r + p = -4$ ...(2)
(1) – (2):
$p = -1 - (-4)$
$= 3$
$r + 3 = -4$
$r = -7$

2.2 Operasi Asas Matriks
Basic Operation on Matrices

1 (a) Ya, kerana kedua-dua matriks mempunyai peringkat yang sama, iaitu 2×2.
Yes, because both matrices have the same order, i.e. 2×2.
(b) Tidak, kerana peringkat matriks pertama ialah 3×2 tetapi peringkat matriks kedua ialah 2×3, iaitu kedua-dua matriks tidak mempunyai peringkat yang sama.
No, because the order of the first matrix is 3×2 *but the order of the second matrix is* 2×3, *i.e. the two matrices do not have the same order.*

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2 (a) $\begin{pmatrix} 2 \\ 1 \\ -3 \end{pmatrix} + \begin{pmatrix} -5 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} -3 \\ 3 \\ -2 \end{pmatrix}$

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

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

$= \begin{pmatrix} 8 & -15 & 10 \\ -6 & 12 & -9 \end{pmatrix}$

3 (a) $(1 \quad 2 \quad 3) + (4 \quad 5 \quad 6) - (7 \quad 8 \quad 9) = (2p - 3q \quad -1 \quad q)$

$q = 3 + 6 - 9$

$= 0$

$2p - 3q = -2$

$2p = -2$

$p = -1$

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

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

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

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

$p + 3 = q$ ...(1)

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

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

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

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

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

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

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

6 (a) $12k = 4$

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

(b) $-20k = -4$

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

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

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

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

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

$4b + 3a = 5$ ...(2)

(1) × 3: $6a - 9b = 27$ ...(3)

(2) × 2 : (–) $6a + 8b = 10$ ...(4)

$-17b = 17$

$b = -1$

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

Substitute $b = -1$ *into* (1)

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

$2a = 6$

$a = 3$

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

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

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

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

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

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

[2 × 3] [3 × 3]

=

Maka, kedua-dua matriks **boleh** didarab.
*Hence, both matrices **can** be multiplied.*

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

[1 × 3] [2 × 3]

≠

Maka, kedua-dua matriks **tidak boleh** didarab.
*Hence, both matrices **cannot** be multiplied.*

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

[2 × 1][1 × 2]

=

2 × 2

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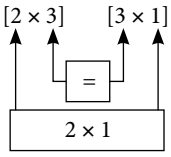
Maka, peringkat matriks yang terhasil ialah 2 × 2.
Thus, the order of the matrix produced is 2 × 2.

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

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

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

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

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

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

12

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

$$(p \times (-3) + 3 \times 2 \quad p \times 1 + 3 \times q) = (-18 \quad 23)$$

$$(-3p + 6 \quad p + 3q) = (-18 \quad 23)$$

$$-3p + 6 = -18$$
$$-3p = -24$$
$$p = 8$$
$$p + 3q = 23$$
$$8 + 3q = 23$$
$$3q = 15$$
$$q = 5$$
$$p - q = 8 - 5$$
$$= 3$$

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

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

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

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

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

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

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

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

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

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

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

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

Secara perbandingan/*By comparison*,
$p = 5$,
$q = 8$,
$3r = -3$, $r = -1$
$3s = 6$, $s = 2$

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

$= \begin{pmatrix} 2 & 3 \\ 6 & 11 \end{pmatrix}$

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

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

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

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

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

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*

$\frac{1}{(8)(3) - (a)(-5)} = -\frac{1}{6}$ dan /*and* $b + 2 = 5$
$24 + 5a = -6$ $\qquad b = 3$
$5a = -30$
$a = -6$

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

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

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

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

Seterusnya, secara perbandingan/*Hence, by comparison,*
$r = 3$, $p = 6$ and $q = 5$.

(b) $5x - 2y - 3 = 0$
$-6x + 3y - 9 = 0$
$5x - 2y = 3$
$-6x + 3y = 9$

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

$\begin{pmatrix} x \\ y \end{pmatrix} = A^{-1}\begin{pmatrix} 3 \\ 9 \end{pmatrix}$
$= \frac{1}{3}\begin{pmatrix} 3 & 2 \\ 6 & 5 \end{pmatrix}\begin{pmatrix} 3 \\ 9 \end{pmatrix}$
$= \frac{1}{3}\begin{pmatrix} 27 \\ 63 \end{pmatrix}$
$= \begin{pmatrix} 9 \\ 21 \end{pmatrix}$

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

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

22 (a) $3x + 2y = 9$ ...(1)
$5x + 4y = 16$ ... (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

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

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

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

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

$$A\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 9 \\ 16 \end{pmatrix}$$

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

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

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

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) $A - (6a \quad -3b) = (-2a \quad -9b)$

$$A = (-2a \quad -9b) + (6a \quad -3b)$$

$$= (4a \quad -12b)$$

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

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

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

$\therefore x = 3, y = 4$

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