SAMPEL PERCUMA

Modul Pentaksiran PdPc STPM 2024 Mathematics M Sem 1 Pahang + Skema

Set penuh: Kertas Percubaan STPM

Sem 1 · Mathematics M

Sampel ini: 6 muka surat. Set penuh ada:

- 3 fail PDF
- Semester 1: kertas percubaan (trial) negeri, subjek yang dipilih + skema
- Blueprint 30 hari Semester 1 (setiap subjek)
- Semester 3: percubaan 2024, 10 subjek, banyak negeri, soalan + skema dalam satu fail

RM12.90

BELI SET PENUH RM12.90 >

nightmew.com/p/stpm · FPX semua bank · download sejurus lepas bayar

Sampel bermula di muka surat sebelah

Section B [15 *marks*]

*Answer **one** question only.*

You may answer all the questions **but** *only the first answer will be marked.*

7. Given that matrix A = $\begin{pmatrix} 2 & 1 & 2 \\ 0 & 3 & -4 \\ 1 & -2 & 0 \end{pmatrix}$,

a) Show that matrix A is a non-singular matrix. [4 *marks*]

b) Find the inverse matrix of A using elementary row operations. [6 *marks*]

Hence, find the values of x, y and z for the following system of linear equations.

$2x + y + 2z = 0$

$3y - 4z = -11$

$x - 2y = 7$ [5 *marks*]

8. Consider the following function $f(x) = x^3 - 3x + 2$,

a) Find the intercepts on the x-axis and y-axis. [2 *marks*]

b) Find the coordinates of the turning points and the point of inflexion. [8 *marks*]

c) Find the intervals on which $f(x)$ is increasing or decreasing. [2 *marks*]

d) Sketch the graph and show all the important features. [3 *marks*]

MODUL PENTAKSIRAN PDPC SEMESTER1 MODUL PENTAKSIRAN PDPC SEMESTER 1

950/1 **STPM 2024**

MATHEMATICS (M) [MATEMATIK (M)]

PAPER 1 (KERTAS 1)

One and a half hours (Satu jam setengah)

MODUL PENTAKSIRAN PDPC SEMESTER1 MODUL PENTAKSIRAN PDPC SEMESTER 1

SKEMA PEMARKAHAN DAN SKEMA JAWAPAN
MODUL PENTAKSIRAN PDPC
SEMESTER 1
NEGERI PAHANG

Instructions to candidates:

DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE ALLOWED TO DO SO.

Answer **all** *questions in Section A.*

Answer **one** *question only in Section B.*

Write the answers in the answer sheets provided. Begin each answer on a new page of the answer sheet. All working should be shown.

Scientific calculators may be used. Programmable and graphic display calculators are ***not*** *allowed.*

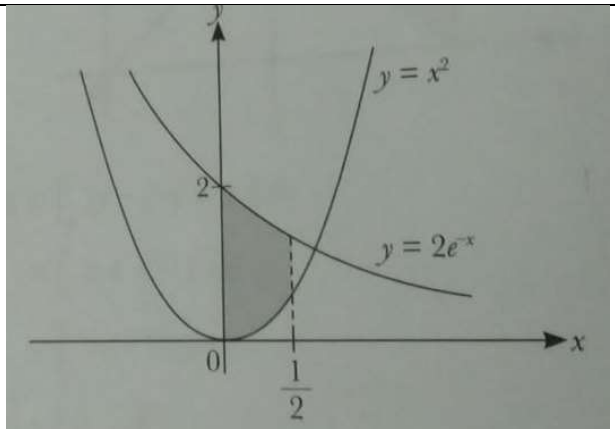
Answers may be written in either English or Malay.

This question paper consists of 6 printed pages

MARKING SCHEME

1.	$P_1(1) = R_1$ $1^3 + a(1)^2 + b(1) + 6 = R_1$ $R_1 = a + b + 7$ $P_2(1) = R_2$ $1^3 - 4a(1)^2 + b(1) - 7 = R_2$ $R_2 = b - 4a - 6$ $R_2 - R_1 = 7$ $(b - 4a - 6) - (a + b + 7) = 7$ $-5a - 13 = 7$ $-5a = 20$ $a = -4$ $P_1(2) = 0$ $2^3 + (-4)(2)^2 + b(2) + 6 = 0$ $2b = 2$ $b = 1$ $P_1(x) = x^3 - 4x^2 + x + 6$ $= (x - 2)(x^2 - 2x - 3)$ $= (x - 2)(x - 3)(x + 1)$	M1 M1 A1 M1 A1 M1 A1
2.	a) $(1 - \frac{x}{2})^{\frac{1}{4}} = 1 + \frac{1}{4}\left(-\frac{1}{2}x\right) + \frac{\frac{1}{4}\left(\frac{1}{4}-1\right)}{2!}(-\frac{1}{2}x)^2 + \frac{\frac{1}{4}\left(\frac{1}{4}-1\right)\left(\frac{1}{4}-2\right)}{3!}(-\frac{1}{2}x)^3 + \cdots$ $= 1 - \frac{1}{8}x - \frac{3}{128}x^2 - \frac{7}{1024}x^3 + \cdots$ is valid for $-1 < \frac{1}{2}x < 1$ b) $\sqrt[4]{16 - 8x} = \sqrt[4]{16(1 - \frac{1}{2}x)}$ $= 2(1 - \frac{x}{2})^{\frac{1}{4}}$ c) $16 - 8x = 15.92$ $x = 0.01$ $\sqrt[4]{16 - 8x} = 2[1 - \frac{1}{8}(0.01) - \frac{3}{128}(0.01)^2 - \frac{7}{1024}(0.01)^3]$ $= 2(0.9987)$ $= 2.00$	M1 M1 A1 M1 A1 B1 M1 A1
3.	$A^2 = \begin{pmatrix}2 & 1 & 1\\ 1 & 2 & 1\\ 1 & 1 & 2\end{pmatrix}\begin{pmatrix}2 & 1 & 1\\ 1 & 2 & 1\\ 1 & 1 & 2\end{pmatrix}$ $= \begin{pmatrix}6 & 5 & 5\\ 5 & 6 & 5\\ 5 & 5 & 6\end{pmatrix}$ $A^2 + mA + nI = 0$ $\begin{pmatrix}6 & 5 & 5\\ 5 & 6 & 5\\ 5 & 5 & 6\end{pmatrix} + \begin{pmatrix}2m & m & m\\ m & 2m & m\\ m & m & 2m\end{pmatrix} + \begin{pmatrix}n & 0 & 0\\ 0 & n & 0\\ 0 & 0 & n\end{pmatrix} = \begin{pmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{pmatrix}$ $\begin{pmatrix}6+2m+n & 5+m & 5+m\\ 5+m & 6+2m+n & 5+m\\ 5+m & 5+m & 6+2m+n\end{pmatrix} = \begin{pmatrix}0 & 0 & 0\\ 0 & 0 & 0\\ 0 & 0 & 0\end{pmatrix}$	M1 M1

	$5+m = 0$ $m = -5$ $6 + 2m + n = 0$ $6 - 10 + n = 0$ $n = 4$ Hence $m = -5$ and $n = 4$ $A^2 - 5A + 4I = 0$ $A^2 = 5A - 4I$ x A both sides, $A^3 = 5A^2 - 4A$ $= 5\begin{pmatrix}6 & 5 & 5\\5 & 6 & 5\\5 & 5 & 6\end{pmatrix} - 4\begin{pmatrix}2 & 1 & 1\\1 & 2 & 1\\1 & 1 & 2\end{pmatrix}$ $= \begin{pmatrix}22 & 21 & 21\\21 & 22 & 21\\21 & 21 & 22\end{pmatrix}$ $A^2A^{-1} = 5AA^{-1} - 4IA^{-1}$ $A = 5I - 4A^{-1}$ $A^{-1} = \frac{1}{4}(5I - A)$ $= \frac{1}{4}\left[\begin{pmatrix}5 & 0 & 0\\0 & 5 & 0\\0 & 0 & 5\end{pmatrix} - \begin{pmatrix}2 & 1 & 1\\1 & 2 & 1\\1 & 1 & 2\end{pmatrix}\right]$ $= \frac{1}{4}\begin{pmatrix}3 & -1 & -1\\-1 & 3 & -1\\-1 & -1 & 3\end{pmatrix}$ $= \begin{pmatrix}\frac{3}{4} & -\frac{1}{4} & -\frac{1}{4}\\-\frac{1}{4} & \frac{3}{4} & -\frac{1}{4}\\-\frac{1}{4} & -\frac{1}{4} & \frac{3}{4}\end{pmatrix}$	A1 A1 M1 A1 M1 M1 A1
4.	a) $f'(x) = \lim_{\delta x \to 0} \frac{f(x+\delta x) - f(x)}{\delta x}$ $= \lim_{\delta x \to 0} \left(\frac{3}{2\sqrt{x+\delta x}} - \frac{3}{2\sqrt{x}}\right)\left(\frac{1}{\delta x}\right)$ $= \lim_{\delta x \to 0} \left(\frac{3\sqrt{x} - 3\sqrt{x+\delta x}}{2\delta x\sqrt{x}\sqrt{x+\delta x}}\right)\left(\frac{3\sqrt{x} + 3\sqrt{x+\delta x}}{3\sqrt{x} + 3\sqrt{x+\delta x}}\right)$ $= \lim_{\delta x \to 0} \frac{-9\delta x}{2\delta x\sqrt{x}\sqrt{x+\delta x}(3\sqrt{x} + 3\sqrt{x+\delta x})}$ $= -\frac{9}{2}\left(\frac{1}{x(6\sqrt{x})}\right)$ $= -\frac{3}{4x^{\frac{3}{2}}}$ b) $3y^2\frac{dy}{dx} - 3\left[\left(x^2\frac{dy}{dx} + y(2x)\right)\right] = 6$ $3y^2\frac{dy}{dx} - 3x^2\frac{dy}{dx} - 6xy = 6$ $3y^2\frac{d^2y}{dx^2} + \frac{dy}{dx}(6y)\frac{dy}{dx} - \left[3x^2\frac{d^2y}{dx^2} + \frac{dy}{dx}(6x)\right] - 6\left(x\frac{dy}{dx} + y\right) = 0$ $3y^2\frac{d^2y}{dx^2} - 3x^2\frac{d^2y}{dx^2} + 6y\left(\frac{dy}{dx}\right)^2 - 12x\frac{dy}{dx} - 6y = 0$	M1 M1 M1 M1 A1 M1 M1 M1

	$\div 3,\ y^2\frac{d^2y}{dx^2} - x^2\frac{d^2y}{dx^2} + 2y(\frac{dy}{dx})^2 - 4x\frac{dy}{dx} - 2y = 0$ $(y^2 - x^2)\frac{d^2y}{dx^2} + 2y(\frac{dy}{dx})^2 - 4x\frac{dy}{dx} = 2y\ (shown)$	 A1
5	 Area = $\int_0^{\frac{1}{2}} 2e^{-x} - x^2 dx$ $= [-2e^{-x} - \frac{x^3}{3}]_0^{\frac{1}{2}}$ $= [-2e^{-\frac{1}{2}} - \frac{(\frac{1}{2})^3}{3}] - [-2e^{-0} - \frac{(0)^3}{3}]$ $= -\frac{2}{\sqrt{e}} - \frac{1}{24} - (-2)$ $= -\frac{2}{\sqrt{e}} + \frac{47}{24}$ $= \frac{-48+47\sqrt{e}}{24\sqrt{e}}$ $= \frac{47e-48\sqrt{e}}{24e}$	D1 D1 D1 M1 M1 M1 A1
6	$\frac{1}{2}\frac{dy}{dx} - \frac{2}{x}y = x^5e^{x^2}$ $\frac{dy}{dx} - \frac{4}{x}y = 2x^5e^{x^2}$ f(x) = $-\frac{4}{x}$ Integrating factor = $e^{-4\int\frac{1}{x}dx} = e^{-4lnx} = e^{lnx^{-4}} = \frac{1}{x^4}$ $\frac{dy}{dx}\left(\frac{1}{x^4}\right) - \frac{4}{x}\left(\frac{1}{x^4}\right)y = 2x^5e^{x^2}\left(\frac{1}{x^4}\right)$ $\frac{d}{dx}\left[y\left(\frac{1}{x^4}\right)\right] = 2xe^{x^2}$ $y\left(\frac{1}{x^4}\right) = \int 2xe^{x^2}\,dx$ Let u = x^2 $\frac{du}{dx} = 2x, du = 2xdx$ $= \int e^u du$ $y\left(\frac{1}{x^4}\right) = e^{x^2} + c$ $y = x^4e^{x^2} + cx^4$	 M1 M1 M1 M1 M1 A1

7	a) $\lvert A\rvert = 2(0-8) - 0\,(0-4) + 1(-4-6)$ $= -26$ Since $\lvert A\rvert \neq 0$, matrix A is a non-singular matrix. (shown)	M1 A1 M1A1
	b) $\left(\begin{array}{ccc\|ccc} 2 & 1 & 2 & 1 & 0 & 0 \\ 0 & 3 & -4 & 0 & 1 & 0 \\ 1 & -2 & 0 & 0 & 0 & 1 \end{array}\right) \xrightarrow{R_1 \leftrightarrow R_3} \left(\begin{array}{ccc\|ccc} 1 & -2 & 0 & 0 & 0 & 1 \\ 0 & 3 & -4 & 0 & 1 & 0 \\ 2 & 1 & 2 & 1 & 0 & 0 \end{array}\right)$	B1M1
	$\xrightarrow{R_3 \to -2R_1 + R_3} \left(\begin{array}{ccc\|ccc} 1 & -2 & 0 & 0 & 0 & 1 \\ 0 & 3 & -4 & 0 & 1 & 0 \\ 0 & 5 & 2 & 1 & 0 & -2 \end{array}\right)$ $\xrightarrow{R_2 \to \frac{1}{3}R_2} \left(\begin{array}{ccc\|ccc} 1 & -2 & 0 & 0 & 0 & 1 \\ 0 & 1 & -\frac{4}{3} & 0 & \frac{1}{3} & 0 \\ 0 & 5 & 2 & 1 & 0 & -2 \end{array}\right)$	M1
	$\begin{matrix} R_1 \to 2R_2 + R_1 \\ R_3 \to -5R_2 + R_3 \end{matrix} \left(\begin{array}{ccc\|ccc} 1 & 0 & -\frac{8}{3} & 0 & \frac{2}{3} & 1 \\ 0 & 1 & -\frac{4}{3} & 0 & \frac{1}{3} & 0 \\ 0 & 0 & \frac{26}{3} & 1 & -\frac{5}{3} & -2 \end{array}\right)$ $\xrightarrow{R_3 \to \frac{3}{26}R_3} \left(\begin{array}{ccc\|ccc} 1 & 0 & -\frac{8}{3} & 0 & \frac{2}{3} & 1 \\ 0 & 1 & -\frac{4}{3} & 0 & \frac{1}{3} & 0 \\ 0 & 0 & 1 & \frac{3}{26} & -\frac{5}{26} & -\frac{3}{13} \end{array}\right)$	M1
	$\begin{matrix} R_1 \to \frac{8}{3}R_3 + R_1 \\ R_2 \to \frac{4}{3}R_3 + R_2 \end{matrix} \left(\begin{array}{ccc\|ccc} 1 & 0 & 0 & \frac{4}{13} & \frac{2}{13} & \frac{5}{13} \\ 0 & 1 & 0 & \frac{2}{13} & \frac{1}{13} & -\frac{4}{13} \\ 0 & 0 & 1 & \frac{3}{26} & -\frac{5}{26} & -\frac{3}{13} \end{array}\right)$	M1
	$A^{-1} = \begin{pmatrix} \frac{4}{13} & \frac{2}{13} & \frac{5}{13} \\ \frac{2}{13} & \frac{1}{13} & -\frac{4}{13} \\ \frac{3}{26} & -\frac{5}{26} & -\frac{3}{13} \end{pmatrix}$	A1
	$\begin{pmatrix} 2 & 1 & 2 \\ 0 & 3 & -4 \\ 1 & -2 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 0 \\ -11 \\ 7 \end{pmatrix}$	M1
	$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} \frac{4}{13} & \frac{2}{13} & \frac{5}{13} \\ \frac{2}{13} & \frac{1}{13} & -\frac{4}{13} \\ \frac{3}{26} & -\frac{5}{26} & -\frac{3}{13} \end{pmatrix} \begin{pmatrix} 0 \\ -11 \\ 7 \end{pmatrix}$	M1
	$\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ -3 \\ 0.5 \end{pmatrix}$ $x = 1, y = -3, z = 0.5$	A1A1A1

TAMAT SAMPEL

Suka sampel ini?

Set penuh: Kertas Percubaan STPM

Sem 1 · Mathematics M

Sampel ini: 6 muka surat. Set penuh ada:

- 3 fail PDF
- Semester 1: kertas percubaan (trial) negeri, subjek yang dipilih + skema
- Blueprint 30 hari Semester 1 (setiap subjek)
- Semester 3: percubaan 2024, 10 subjek, banyak negeri, soalan + skema dalam satu fail

RM12.90

BELI SET PENUH RM12.90 >

nightmew.com/p/stpm · FPX semua bank · download sejurus lepas bayar