SAMPEL PERCUMA

Skema Jawapan Trial STPM Math M Semester 1

Set penuh: Kertas Percubaan STPM

Sem 1 · Mathematics M

Sampel ini: 4 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 A [45 *marks*]

Answer **all** *the questions*

1. The polynomial $P(x)$ and $Q(x)$ are defined by

$$P(x) = x^8 - 1$$
$$Q(x) = x^4 + 4x^3 + ax^2 + bx + 5$$

Given that $x - 1$ and $x + 1$ are factors of $P(x)$.

(a) It is known that when $Q(x)$ is divided by $x^2 - 1$ a remainder $2x + 3$ is obtained. Find the values of a and b. [4 *marks*]

(b) With these values of a and b, find the remainder (without using long division) when the polynomial $[3P(x) + 4Q(x)]$ is divided by $x^2 - 1$. [2 *marks*]

2. (a) Show that the first four non-zero terms in the series expansion of $\left(1 - \frac{1}{n}\right)^{\frac{1}{n}}$, where n is a positive integer, in ascending powers of $\frac{1}{n}$ are $1 - \left(\frac{1}{n}\right)^2 - \frac{1}{2}\left(\frac{1}{n}\right)^3 + \frac{1}{6}\left(\frac{1}{n}\right)^4$. [4 *marks*]

(b) By giving n a suitable value, use the four non-zero terms of the series to find a value for $(0.9)^{\frac{1}{n}}$, giving your answer to five decimal places. [3 marks]

3. The curve C has equation

$$16y^3 + 9x^2y - 54x = 0$$

(a) Find $\frac{dy}{dx}$ in terms of x and y [3 *marks*]

(b) Find the coordinates of the points on C where $\frac{dy}{dx} = 0$. [4 *marks*]

4. The matrix $\boldsymbol{M}$ is given by $\boldsymbol{M} = \begin{pmatrix} a & -a & 1 \\ 3 & a & 1 \\ 4 & 2 & 1 \end{pmatrix}$.

(a) Find, in terms of a, the determinant of $\boldsymbol{M}$. [3 *marks*]

(b) Hence, find the values of a for which $\boldsymbol{M}$ is singular. [2 *marks*]

(c) A system of linear equations is given by

$$ax - ay + z = 3k$$
$$3x + ay + z = 0$$
$$4x + 2y + z = k$$

where k is a non-zero constant.

(i) For the value of $a > 1$, the system of linear equations is consistent. Write the augmented matrix for the system of linear equations, and reduce it to row echelon form. Show that the system of linear equations has an infinite number of solutions. [5 *marks*]

(ii) Hence, find the general solutions of the linear equations in terms of k. [2 *marks*]

5. Express $\frac{2x+1}{(x^2+1)(2-x)}$ in the form $\frac{Ax+B}{x^2+1} + \frac{C}{2-x}$ where A, B and C are constants. [3 *marks*]

Hence, evaluate $\int_0^1 \frac{2x+1}{(x^2+1)(2-x)}\, dx$. [4*marks*]

6. Find the particular solution of the differential equation

$$e^x \frac{dy}{dx} - y^2(x+1) = 0,$$

for which $y = 1$ when $x = 0$. Express y in terms of x. [6 *marks*]

Section B [15 marks]

Answer **one** *question only.*

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

7. Functions *f, g* and *h* are defined as follows:

$$f: x \to \ln(1+x), \qquad x > -1$$
$$g: x \to 1 - e^{-x}, \qquad x \in R$$
$$h: x \to x^2 + 4x, \qquad x > k$$

(a) Sketch the graphs of f and f^{-1} on the same axes, indicating clearly the relationship between those two graphs. [3 *marks*]

(b) Give a reason why the composite function $g \circ f$ exists. Find $g \circ f$ and state its range. [5 *marks*]

(c) State the least value of *k* such that *h* is one-to-one function. Hence, find the inverse function, h^{-1}. [4 *marks*]

(d) Given that $(g \circ h)(x) = 1 - e^3$, find the values of *x*. [3 *marks*]

8. The region *R,* in the first quadrant, is bounded by the line $y = 4 - x$ and the curve $y = \frac{4}{1+x}$ between their points of intersection.

(a) Find the coordinates of these points of intersection and draw a sketch showing the region *R.* [5 *marks*]

(b) Show that the area of *R* is $\frac{1}{2}(15 - 16ln2)$. [5 *marks*]

(c) Find the volume of the solid formed when *R* is rotated through 2π radians about the *x*-axis. [5 *marks*]

END OF QUESTION PAPER

MARKING SCHEME

MATHEMATICS M STPM TRIAL SEM 1 2022

NO.	ANSWER	MARKS
1(a)	$Q(1) = 2(1) + 3 = 5$ $1 + 4 + a + b + 5 = 5$ $a + b = -5$ ……..(1) $Q(-1) = 2(-1) + 3 = -1$ $1 - 4 + a - b + 5 = 1$ $a - b = -1$ ……..(2) $a = -3, b = -2$	 M1 A1 M1A1
(b)	when 3P(x) is divided by $x^2 - 1$, remainder is 0 when 4Q(x) is divided by $x^2 - 1$, remainder is $4(2x + 3)$ Therefore, when $[3P(x) + 4Q(x)]$ is divided by $x^2 - 1$, remainder is $8x + 12$	 M1 A1
		Q1 [6]
2(a)	$\left(1-\frac{1}{n}\right)^{\frac{1}{n}} = 1+\frac{1}{n}\left(-\frac{1}{n}\right)+\frac{\left(\frac{1}{n}\right)\left(\frac{1}{n}-1\right)}{2!}\left(-\frac{1}{n}\right)^2+\frac{\left(\frac{1}{n}\right)\left(\frac{1}{n}-1\right)\left(\frac{1}{n}-2\right)}{3!}\left(-\frac{1}{n}\right)^3+\cdots$ $= 1-\left(\frac{1}{n}\right)^2+\frac{1}{2}\left(\frac{1}{n}\right)^2\left[\left(\frac{1}{n}\right)^2-\frac{1}{n}\right]-\frac{1}{6}\left(\frac{1}{n}\right)^4\left[\left(\frac{1}{n}\right)^2-3\left(\frac{1}{n}\right)+2\right]+\cdots$ $= 1-\left(\frac{1}{n}\right)^2+\frac{1}{2}\left(\frac{1}{n}\right)^4-\frac{1}{2}\left(\frac{1}{n}\right)^3-\frac{1}{6}\left(\frac{1}{n}\right)^6+\frac{1}{2}\left(\frac{1}{n}\right)^5-\frac{1}{3}\left(\frac{1}{n}\right)^4+\cdots$ $= 1-\left(\frac{1}{n}\right)^2-\frac{1}{2}\left(\frac{1}{n}\right)^3+\frac{1}{6}\left(\frac{1}{n}\right)^4$	M1A1 M1 (expand) A1
(b)	$n = 10$ $(0.9)^{\frac{1}{10}} = \left(1-\frac{1}{10}\right)^{\frac{1}{10}}$ $= 1-\left(\frac{1}{10}\right)^2-\frac{1}{2}\left(\frac{1}{10}\right)^3+\frac{1}{6}\left(\frac{1}{10}\right)^4$ $= 0.98952$	B1 M1 A1
		Q2 [7]

TAMAT SAMPEL

Suka sampel ini?

Set penuh: Kertas Percubaan STPM

Sem 1 · Mathematics M

Sampel ini: 4 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