950/1 **TRIAL STPM**

MATHEMATICS M

PAPER 1

One and a half hours

SIJIL TINGGI PERSEKOLAHAN MALAYSIA

Instruction to candidates:

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

Answer **all** questions in Section A and any **one** question in Section B. Answer may be written in either English or Bahasa Malaysia.

All necessary working should be shown clearly.

Scientific calculators may be used. Programmable and graphic display calculators are prohibited.

A list of mathematical formulae is provided.

This question paper consists of 5 printed pages.

Section A

[45 marks]

Answer all questions.

1. Given that $y^3 = lnxy^2$ with $x > 0$ and $y > 0$.

(a) Find $\frac{dy}{dx}$ [3 marks]

(b) Evaluate $\frac{dy}{dx}$ when $y = 1$ [2 marks]

2. (a) Express $\frac{5x^2-9x+4}{(x+3)(2x^2+1)}$ in partial fractions. [4 marks]

(b) Hence, evaluate $\int_1^3 \frac{5x^2-9x+4}{(x+3)(2x^2+1)} dx$ by giving your answer correct to three significant figures. [5 marks]

3. Find the general solution of $x\frac{dy}{dx} - 2y = x^2$. [6 marks]

4. A pharmacist prescribed to a client 11 mg of vitamin A, 18 mg of vitamin B and 14 mg of vitamin C each day. The client can choose from the combination of three types of tablets namely P, Q and R. Each tablet of P contains 1 mg of vitamin A, 1 mg of vitamin B and 2mg of vitamin C. Each tablet of Q contains 1 mg of vitamin A, 2 mg of vitamin B and 1 mg of vitamin C. Each tablet of R contains 3 mg of vitamin A, 5 mg of vitamin B and 3 mg of vitamin C. The above information is tabulated as follows.

Vitamin	Type of tablets			Amount of vitamin (mg)
	P	Q	R	
A	1	1	3	11
B	1	2	5	18
C	2	1	3	14

By using *x* as the number of tablets of *P*, *y* the number of tablets of *Q* and *z* the number of tablets of *R*,

(a) form a system of linear equations based on the above information. [2 marks]

(b) use the Gauss-Jordan elimination method to solve the system of linear equations described in (a). [8 marks]

5. Functions *f* and *g* are defined by

$$f: x \to \ln(x+1),\ x > -1,\ x \epsilon R$$

$$g: x \to x^2 + 2x,\ x > -1,\ x \epsilon R$$

(a) State the range of f and determine the inverse function f^{-1}. [3 marks]

(b) Sketch the graph of f and f^{-1} on the same coordinates axes. [2 marks]

(c) Determine whether g is a one-to-one function, giving a reason for your answer and state the range of g. [3 marks]

(d) Find the composite function $f \circ g$. [2 marks]

6. Expand $(1+y)^8$ in ascending powers of y, up to and including the term in y^3. [2 marks]

In the expansion of $(1 + x + kx^2)^8$ in ascending powers of *x*, the coefficient of x^3 is zero. Find the value of the constant k. [3 marks]

Section B

[15 marks]

Answer any one question in this section.

7. 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*. [4 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. [6 marks]

8. A geometric series has common ratio *r*, and an arithmetic series has first term *a* and common difference *d*, where *a* and *d* are non-zero. The first three terms of the geometric series are equal to the first, fourth and sixth terms respectively of the arithmetic series.

(a) Show that $3r^2 - 5r + 2 = 0$. [4 marks]

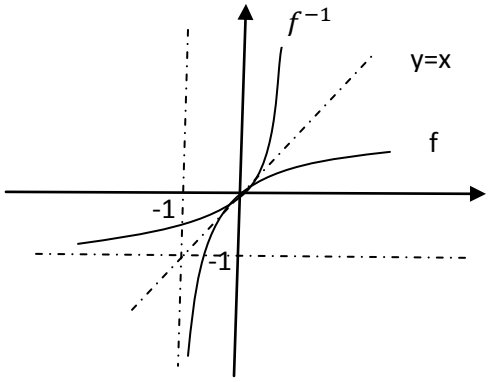
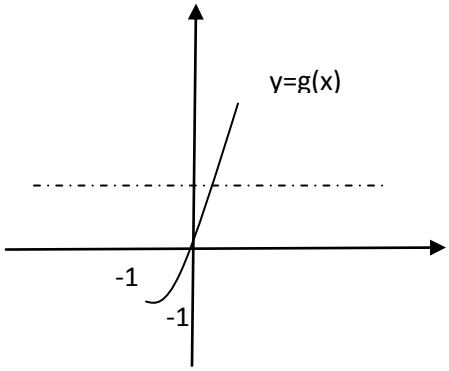
(b) Deduce that the geometric series is convergent and find, in terms of *a*, the sum to infinity. [5 marks]

(c) The sum of the first *n* terms of the arithmetic series is denoted by *S*. Given that $a > 0$, find the set of possible values of *n* for which *S* exceeds $4a$. [6 marks]

MARKING SCHEME
TRIAL STPM TERM 1 2013
MATHEMATICS M (950/1)

SECTION A (45 Marks)

No.	SCHEME	MARKS
1	(a) $y^3 = lnx + 2lny$ $3y^2\frac{dy}{dx} = \frac{1}{x} + \frac{2}{y}\frac{dy}{dx}$ $\frac{dy}{dx}\left(3y^2 - \frac{2}{y}\right) = \frac{1}{x}$ $\frac{dy}{dx} = \frac{y}{x(3y^3 - 2)}$	B1 M1 A1
	(b) When y = 1, x = e $\frac{dy}{dx} = \frac{1}{e[3(1)^3 - 2]} = \frac{1}{e}$	M1A1
		5 marks
2	(a) $\frac{5x^2-9x+4}{(x+3)(2x^2+1)} = \frac{A}{x+3} + \frac{Bx+C}{2x^2+1}$ $5x^2 - 9x + 4 = A(2x^2 + 1) + (Bx + C)(x + 3)$ x = -3, 76 = 19A A = 4 x = 0, 4 = 4 + 3C C = 0 Equate the coefficient of x^2, B = -3 $\frac{5x^2 - 9x + 4}{(x + 3)(2x^2 + 1)} = \frac{4}{x + 3} - \frac{3x}{2x^2 + 1}$	B1 M1A1 A1
	(b) $\int_1^3 \frac{5x^2-9x+4}{(x+3)(2x^2+1)}dx = \int_1^3 \left[\frac{4}{x+3} - \frac{3x}{2x^2+1}\right]dx$ $= \int_1^3 \frac{4}{x+3}dx - \frac{3}{4}\int_1^3 \frac{4x}{2x^2+1}dx$ $=\left[4ln\lvert x+3\rvert - \frac{3}{4}ln\lvert 2x^2+1\rvert\right]_1^3$ = 0.237	M1 M1A1 M1A1
		9 marks

	(b)  (c)  The horizontal line y = 1 cuts the graph only once, therefore g is one-to-one. $R_g = \{y: y > -1\}$ (d) $fog(x) = f(x^2 + 2x)$ $= \ln(x^2 + 2x + 1)$ $= ln(x+1)^2$ $= 2\ln(x+1)$ $fog: x \to 2\ln(x+1), x > -1$	D1 D1 M1 A1 A1 M1 A1
		10 marks
6	$(1+y)^8 = 1 + 8y + \frac{(8)(7)}{2!}(y)^2 + \frac{(8)(7)(6)}{3!}(y)^3 + \ldots\ldots$ $= 1 + 8y + 28\,y^2 + 56y^3 + \cdots$ Let $y = x + kx^2$, Hence, $(1 + (x+kx))^8 = 1 + 8(x+kx^2) + 28(x+kx^2)^2 + 56(x+kx^2)^3 + \cdots$ $= \cdots + 28(\ldots. + 2kx^3 + \cdots) + 56(x^3 + \cdots)$ $= (56k + 56)x^3 + \cdots$ As coefficient of x^3 is zero, $56k + 56 = 0$ $\therefore k = -1$	M1 A1 M1 A1 A1 (5 marks)

Suka sampel ini?

Kertas Percubaan STPM

Sem 1 · Mathematics M

- 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

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