

Candidate Name :

MPSK

February 2024
General Examination

Further Pure Mathematics

Sample Trainees Paper

2024 Early

GNU
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Upper Secondary Level

Topics Included :

- Logarithmic functions and Indices
- Quadratic Function
- Graphs
- Differentiation
- Integration
- Area Under Curve
- Trigonometry
- Rectangular Cartesian Coordinates

Instructions

- Use **black** ink or ball-point pen.
- Fill in the boxes at the top of this page with your name and centre name.
- Answer all questions.
- Without sufficient working, correct answers may be awarded no marks.
- You must **NOT** write anything on the formulae page. Anything you write on the formulae page will gain NO credit.

Details

- This paper was made by **MIN PYAE SONE KHAT**.
- All questions were made independently and **NO** questions were ever reused.
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- This was created using **Figma** and **Geogebra**.



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- 1 There consists two curves. Curve **C** and Curve **A**, two curves intersects at four points as shown below in **Diagram 1A**
- Curve **C** and Curve **A** has equations $\sin(x) + 1$ and $\cos(2x) + 1$ respectively.
- Find the coordinates of A, B, C and D.

(6)

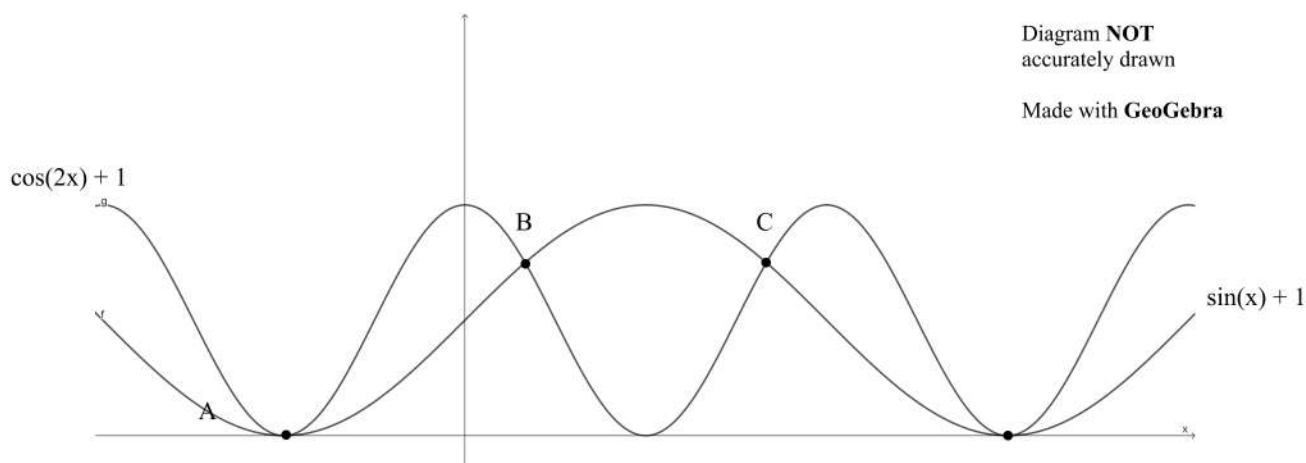


Diagram **NOT**
accurately drawn

Made with GeoGebra

Diagram 1A

2

$$\frac{d}{dx} \text{ of } \frac{1}{x+1} = \ln(x+1)$$

Hence, Find the area of shaded region to 2 decimal places in **Diagram 1B** below.

(4)

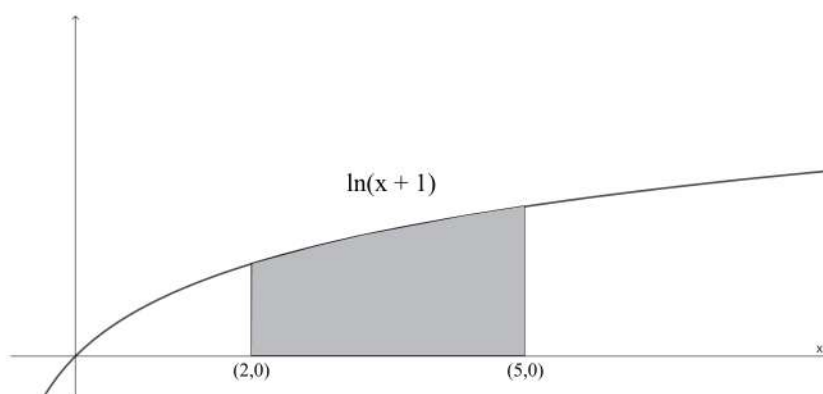


Diagram **NOT**
accurately drawn

Diagram 1B

- 3 Point A is the stationary point of the curve $y = 3x^2 + 6x + 1$.
- Line L with normal gradient $-\frac{1}{3}$ at A, crosses point A and intersects the curve again at point B.
- (a) Find the equation of Line L. (3)
- (b) Find the coordinates of point B. (3)
- Line D, which is normal to Line L, also intersects the curve at point C.
- (c) Find the coordinates of point C to 3 decimal places. (3)
- (d) Find the area of $\triangle ABC$ (2)

- 4 (a) Write $(8 + 16x)^{1/3}$ in the form of $P(1 + Qx)^{1/3}$ (2)
- (b) Expand $(4 + ax)^{-3}$ in ascending power of x up to and including the term in x^2 (3)
Express each coefficient of x in terms of a as constants. Where $a > 0$
- (c) When $\frac{2}{3}$ is inserted into the expansion, it outputs the result of $\frac{1}{16}$ (6)
Find the value of a .

A student attempts to substitute $x = \frac{5}{2}$ into both sides of this equation to find an approximate value of a constant.

- (d) State, giving a **reason**, if the expansion is valid for this value of x . (1)

- 5 Solve for x , giving your solution to 3 decimal places. (6)

$$\ln(x^3) + 2\log_x e + 2\ln(e) = 7$$

- 6 $f(x) = ax^3 + x^2 - 13x + b$ where a and b are both non zero integers. (4)

$(x + 3)$ is the factor of this cubic equation.

When $f(x)$ is divided by $(x - 5)$ the remainder is 216

- (a) Find the value of a and b (4)
- (b) Hence factorise $f(x)$ completely. (3)

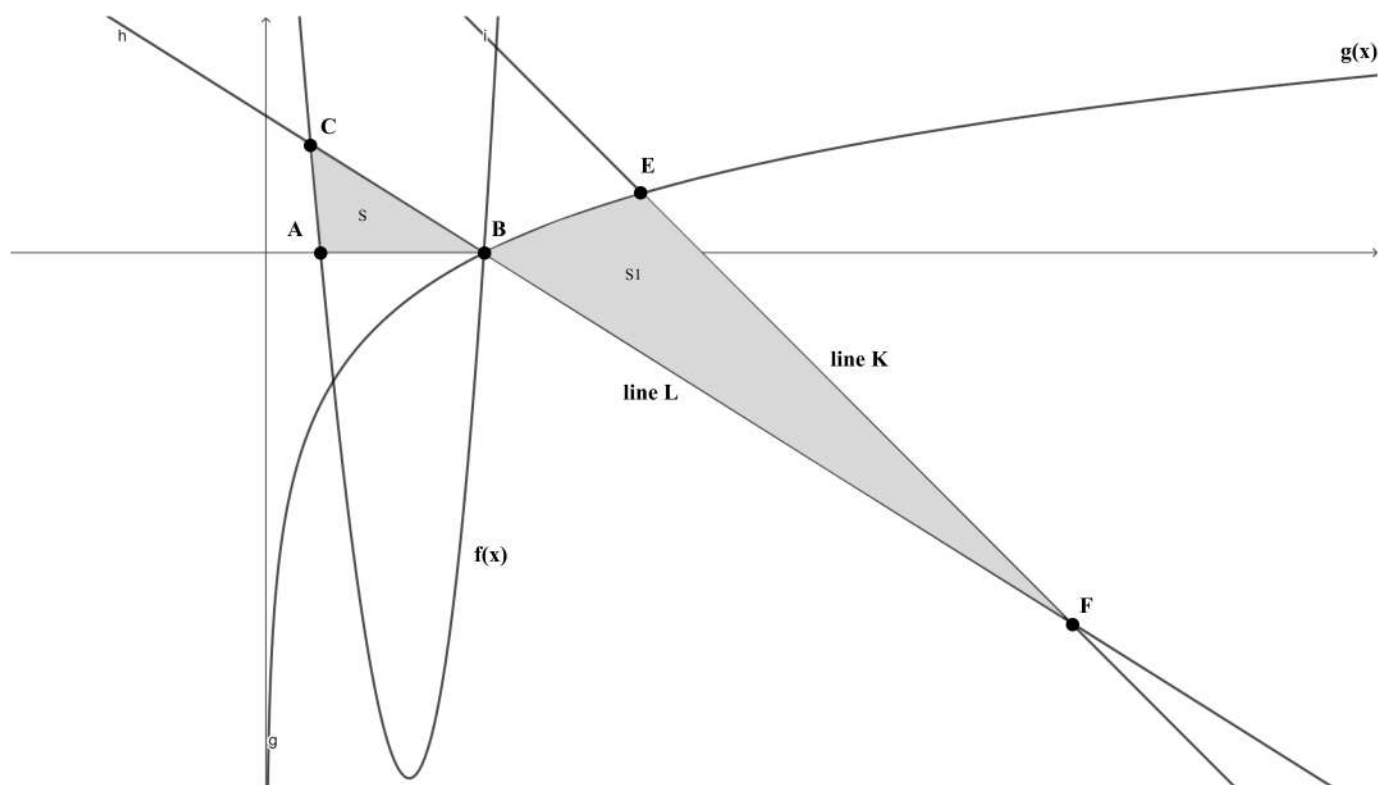


Diagram 6A

The remaining questions are on the next page

Please refer to the **Diagram 6A** in the previous page since it may be needed
 Read the questions carefully, the question itself is experimental, any erroneous data can be reported

Continuity of question 6 starts here

The curve $y = f(x)$ is shown in Diagram 6A.
 It also intersects on another two points with x-axis at point A and point B.

(c) Find coordinates of A and B (2)

Another curve $y = g(x)$, where $g(x) = \ln\left(\frac{x}{2}\right)$ also intersects x-axis at point B

Line L with equation $1x + 1.59y = 2$ also intersects x-axis at point B. Additionally, it intersects with curve $y = f(x)$ at point C.

(d) Find coordinates of C (3)

With points A, B, C and x-axis forms a region S.

(e) Find the area of S to 3 decimal places (6)

Another line K with equation $-0.5x - 0.5y = -2$ intersects curve $g(x)$ at point E.

Ultimately, Line L and Line K intersects each other at point F.

(f) Find the coordinates of E (2)

(g) Find the coordinates of F (2)

Altogether, consisting of point B, E and F forms another region S1.

(h) Find the area of S1 to 3 decimal places (8)

Thanks for consideration of this paper.

Total Marks - (69)

END OF PAPER

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For IGCSE students by an IGCSE student