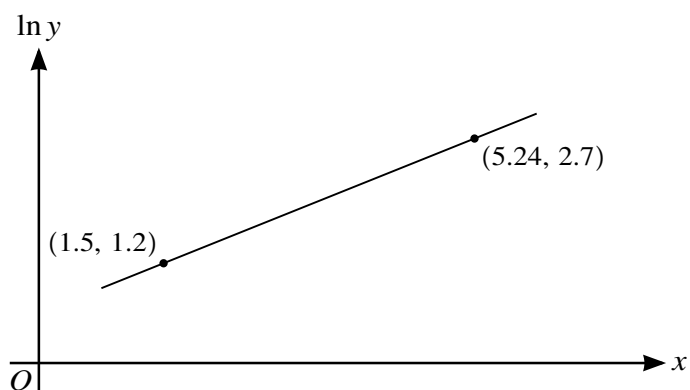


- 1** Find the quotient and remainder when $6x^4 + x^3 - x^2 + 5x - 6$ is divided by $2x^2 - x + 1$. [3]

[illegible]



The variables x and y satisfy the equation $y^2 = Ae^{kx}$, where A and k are constants. The graph of $\ln y$ against x is a straight line passing through the points $(1.5, 1.2)$ and $(5.24, 2.7)$ as shown in the diagram.

Find the values of A and k correct to 2 decimal places.

[5]


[illegible]

3 Find the exact value of

$$\int_1^4 x^{\frac{3}{2}} \ln x \, dx.$$

[5]

A series of horizontal dotted lines for writing.

A circular logo in the bottom right corner with the text "GO AHEAD" in a stylized font. The logo is partially cut off by the edge of the page.

4 A curve has equation $y = \cos x \sin 2x$.

Find the x -coordinate of the stationary point in the interval $0 < x < \frac{1}{2}\pi$, giving your answer correct to 3 significant figures. [6]

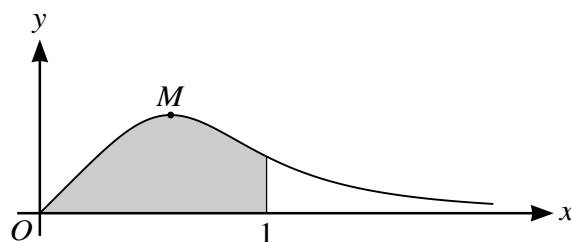
[illegible]

- 5 (a)** Express $\sqrt{2} \cos x - \sqrt{5} \sin x$ in the form $R \cos(x + \alpha)$, where $R > 0$ and $0^\circ < \alpha < 90^\circ$. Give the exact value of R and the value of α correct to 3 decimal places. [3]

[illegible]

(b) Hence solve the equation $\sqrt{2} \cos 2\theta - \sqrt{5} \sin 2\theta = 1$, for $0^\circ < \theta < 180^\circ$. [4]

Blank lined paper with a dotted midline for handwriting practice. The page includes a header section with a dotted line for a name and a date section with a dotted line for a date. The main body of the page is filled with horizontal lines for writing practice. A small logo is visible in the bottom right corner.



(a) Find the x -coordinate of M , giving your answer correct to 3 decimal places.

[4]

[illegible]

[illegible]

7 The variables x and y satisfy the differential equation

$$\frac{dy}{dx} = \frac{y-1}{(x+1)(x+3)}.$$

It is given that $y = 2$ when $x = 0$.

Solve the differential equation, obtaining an expression for y in terms of x .

[9]

[illegible]

- 8** (a) Solve the equation $(1 + 2i)w + iw^* = 3 + 5i$. Give your answer in the form $x + iy$, where x and y are real. [4]

Handwriting practice lines on a page. The page contains 20 horizontal dotted lines for writing practice. A small circular logo is visible in the bottom right corner, featuring the text 'AHEAD'.

- (b) (i) On a sketch of an Argand diagram, shade the region whose points represent complex numbers z satisfying the inequalities $|z - 2 - 2i| \leq 1$ and $\arg(z - 4i) \geq -\frac{1}{4}\pi$. [4]

- (ii) Find the least value of $\text{Im } z$ for points in this region, giving your answer in an exact form. [2]

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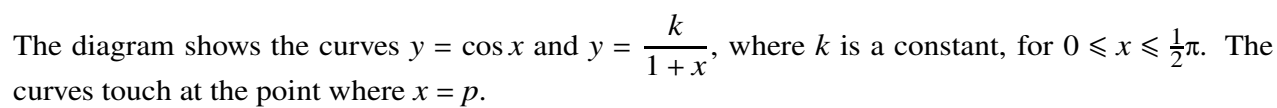
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- [illegible]

- (b) Use the iterative formula $p_{n+1} = \tan^{-1}\left(\frac{1}{1+p_n}\right)$ to determine the value of p correct to 3 decimal places. Give the result of each iteration to 5 decimal places. [3]

[illegible]

- (c) Hence find the value of k correct to 2 decimal places. [2]

[illegible]

- 10** With respect to the origin O , the points A and B have position vectors given by $\vec{OA} = 6\mathbf{i} + 2\mathbf{j}$ and $\vec{OB} = 2\mathbf{i} + 2\mathbf{j} + 3\mathbf{k}$. The midpoint of OA is M . The point N lying on AB , between A and B , is such that $AN = 2NB$.

(a) Find a vector equation for the line through M and N .

[5]

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. In the bottom right corner, there is a small, circular logo with the word "AHEAD" written in a stylized font. The logo is partially cut off by the edge of the page.

The line through M and N intersects the line through O and B at the point P .

- (b) Find the position vector of P . [3]

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- (c) Calculate angle OPM , giving your answer in degrees. [3]

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This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. In the bottom right corner, there is a small, partially visible circular logo. The logo has a blue border and contains the word "AHEAD" in white capital letters. Below the word "AHEAD", there is a red graphic element that appears to be a stylized arrow or a part of a larger design. The rest of the page is completely blank and white.



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