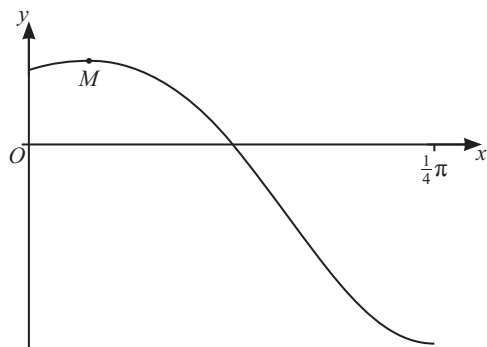




The diagram shows the graph of $y = e^{\sin 2x} \cos 4x$ for $0 \leq x \leq \frac{1}{4}\pi$, and its maximum point M .

Find the x -coordinate of M .

[5]

7 The parametric equations of a curve are

$$x = t^2 - \ln(2t + 1), \quad y = \frac{t}{2t + 1}.$$

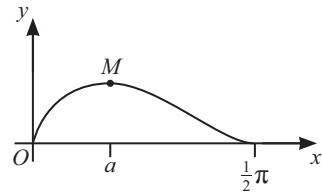
Obtain a simplified expression for $\frac{dy}{dx}$ in terms of t . [5]

4 The parametric equations of a curve are

$$x = e^{\tan t}, \quad y = 3 \tan^2 t.$$

Find the equation of the tangent to the curve at the point $(e, 3)$. Give your answer in the form $y = mx + c$, where m and c are exact. [6]

11



The diagram shows the curve $y = \cos x \sqrt{\sin 2x}$ for $0 \leq x \leq \frac{1}{2}\pi$. The curve has a maximum point at M , where $x = a$.

- (a) Find the exact value of a .

[6]

- Find the exact volume of the solid generated.

[5]

If you use the following page to complete the answer to any question, the question number must be clearly shown.

The graph shows a smooth curve in the first quadrant of a Cartesian coordinate system. The vertical axis is labeled y and the horizontal axis is labeled x . The origin is marked with O . The curve starts at O , rises to a peak labeled M , and then descends to the x -axis at the point $\frac{1}{2}\pi$.

(a) Find the exact x -coordinate of M .

[6]

- (b) By using the substitution $u = \cos x$, find the area of the region bounded by the curve, the x -axis between $x = 0$ and $x = \frac{1}{4}\pi$, and the line $x = \frac{1}{4}\pi$. [5]

Additional page

If you use the following page to complete the answer to any question, the question number must be clearly shown.

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting or typing. There are no margins, text, or other markings on the page.