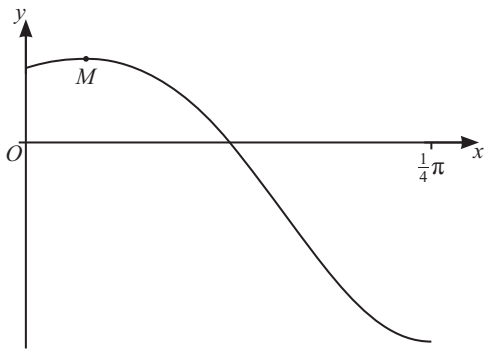
4



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

Find the x-coordinate of M. [5]

7 The parametric equations of a curve are

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

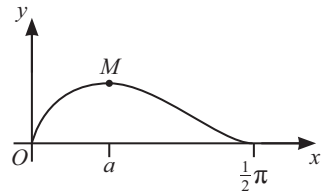
Obtain a simplified expression for $\frac{dy}{dx}$ in terms of t. [5]

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 $0 \leqslant x \leqslant \frac{1}{2}\pi$. The curve has a maximum point at M, where $x = a$.

(a) Find the exact value of a. [6]

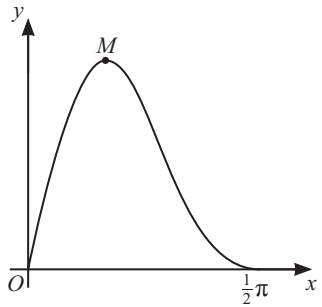
(b) The region enclosed between the x-axis and the curve is rotated through 2π radians about the x-axis.

Find the exact volume of the solid generated. [5]

Additional page

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

11



The diagram shows the graph of $y = 5\sin 2x\cos^2 x$ for $0 \leqslant x \leqslant \frac{1}{2}\pi$ and its maximum point M.

(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.