

PAST YEARS EXAMINATION QUESTIONS

1 The equation of a curve is $y = \cos^2 x$.

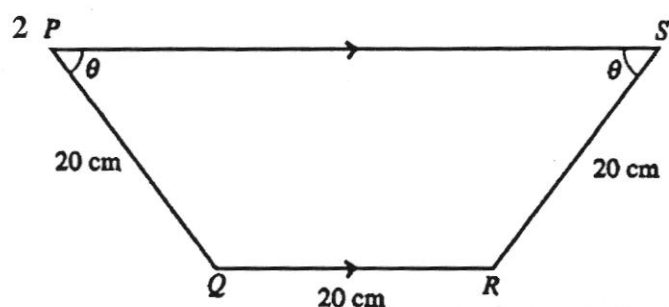
(i) Show that $\frac{dy}{dx} = -\sin 2x$.

(ii) Find the equation of the tangent to the curve at the point P on the curve when $x = \frac{\pi}{4}$.

The tangent at P cuts the x -axis at the point A and the y -axis at the point B .

(iii) Find the area of the triangle OAB , where O is the origin.

N2002/II/3(b) (AO Maths)



The diagram shows a trapezium $PQRS$ in which $PQ = QR = RS = 20$ cm and angle $QPS =$ angle $RSP = \theta$.

(i) Show that the area, A cm², of the trapezium is given by $A = 400 \sin \theta (1 + \cos \theta)$.

(ii) Given that θ is in radians and that θ can vary, find the value of θ for which A has a stationary value.

N2004/II/6 (AO Maths)

3 A curve has the equation $y = 2 \cos x - \cos 2x$, where $0 < x \leq \frac{\pi}{2}$.

(i) Obtain expressions for $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$. [4]

(ii) Given that $\sin 2x$ may be expressed as $2 \sin x \cos x$, find the x -coordinate of the stationary point of the curve and determine the nature of this stationary point. [4]

(iii) Evaluate $\int_{\frac{\pi}{3}}^{\frac{\pi}{2}} y \, dx$. [3]

N2005/II/12 (OR)

4 Find the equation of the tangent to the curve $y = 2 + 3 \tan x$ at the point where $x = \frac{3\pi}{4}$.

N2006/II/2 (AO Maths)

5 Use the derivative of $\cos \theta$ to show that

$$\frac{d}{d\theta} (\sec \theta) = \sec \theta \tan \theta.$$

N2006/II/9 (part) (Maths C)

6 Differentiate $\frac{x}{\cos x}$ with respect to x .

N2006/II/14(ii) (AO Maths)

7 Differentiate $\frac{x}{\sin x}$ with respect to x .

N2006/II/9(ii) (AO Maths)

8 (i) Differentiate $\tan (2x + 1)$ with respect to x . [2]

(ii) Explain why the curve $y = \tan (2x + 1)$ has no stationary points. [1]

N2007/II/5 (part)

9 Variables x and y are related by the equation $y = 2 \cos^2 x + 1$, where $0 \leq x \leq \frac{\pi}{2}$. Given that x is decreasing at the rate of 0.05 radians per second, find the corresponding rate of change of y when $y = 2$.

N2008/II/5 (Syll. 4018)

10 The equation of a curve is $y = \frac{\sin x}{2 - \cos x}$. Find the x -coordinate, where $0 < x < \frac{\pi}{2}$ of the point at which the tangent to the curve is parallel to the x -axis. [6]

N2008/II/7

11 The normal to the curve $y = 1 - 3 \tan x$, at the point where the curve crosses the y -axis, passes through the point $(k, 3)$. Find the value of k . [6]

N2009/II/5