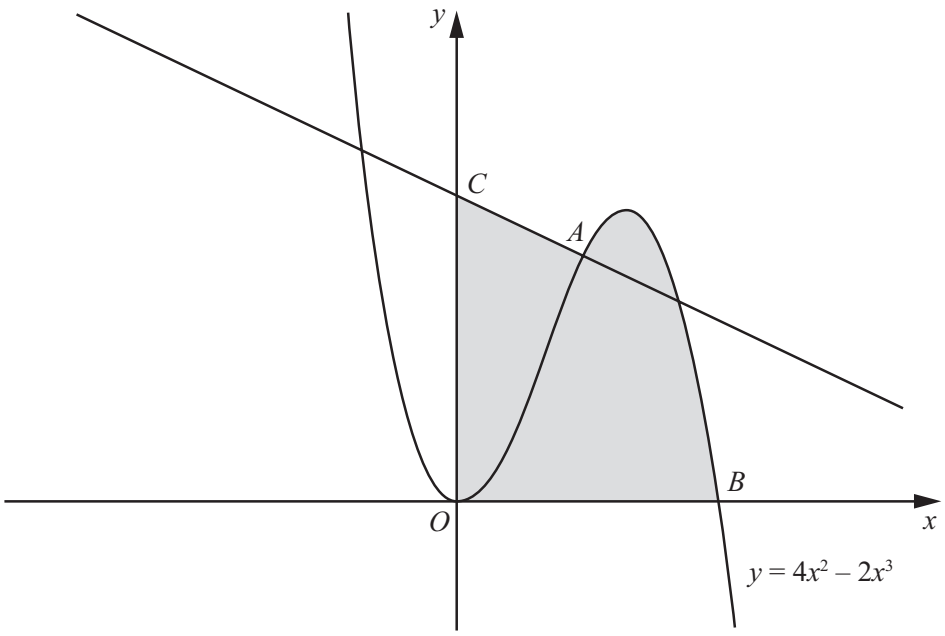
Integration 2 Area

1)

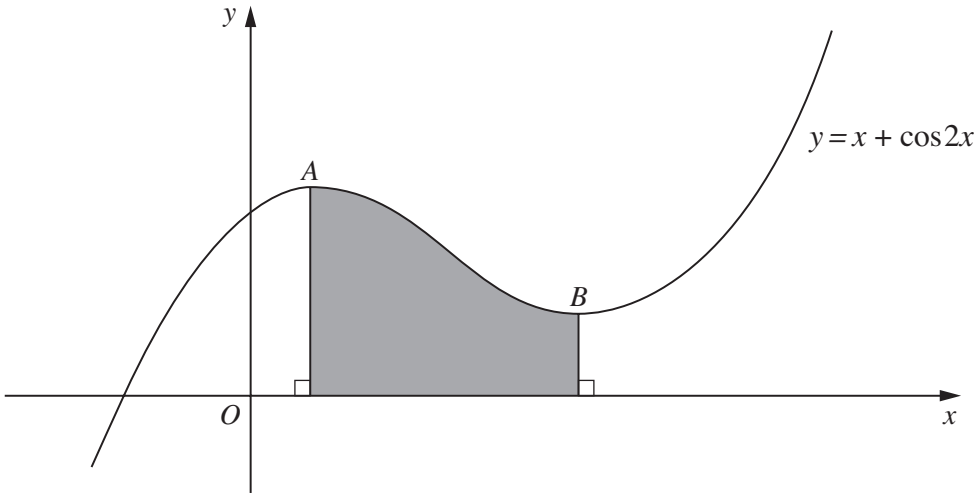


The diagram shows the curve $y = 4x^2 - 2x^3$. The point A lies on the curve and the x-coordinate of A is 1. The curve crosses the x-axis at the point B. The normal to the curve at the point A crosses the y-axis at the point C.

(i) Show that the coordinates of C are $(0, 2.5)$. [5]

(ii) Find the area of the shaded region. [6]

2)

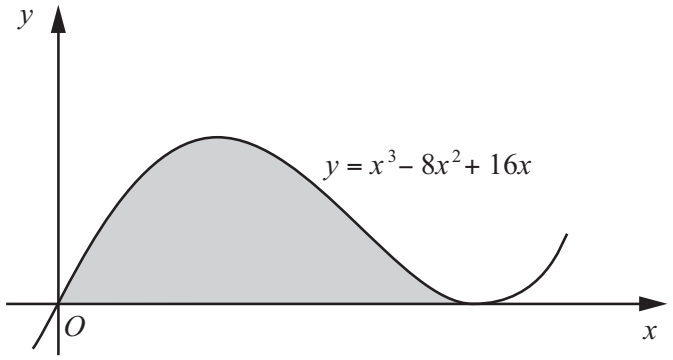


The diagram shows part of the curve $y = x + \cos 2x$. The curve has a maximum point at A and a minimum point at B.

(i) Find the x-coordinate of the point A and of the point B. [6]

(ii) Find, in terms of π, the area of the shaded region. [5]

3)

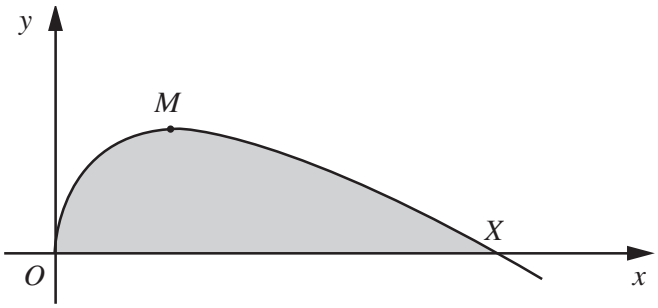


The diagram shows part of the curve $y = x^3 - 8x^2 + 16x$.

(i) Show that the curve has a minimum point at (4, 0) and find the coordinates of the maximum point. [4]

(ii) Find the area of the shaded region enclosed by the x-axis and the curve. [4]

4)

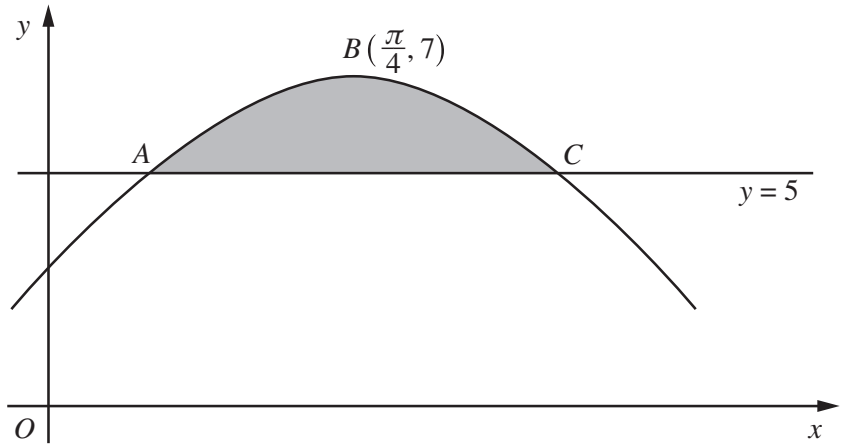


The diagram shows part of the curve $y = 4\sqrt{x} - x$. The origin O lies on the curve and the curve intersects the positive x-axis at X. The maximum point of the curve is at M. Find

(i) the coordinates of X and of M, [5]

(ii) the area of the shaded region. [4]

5)



The diagram shows part of a curve for which $\frac{dy}{dx} = 8\cos 2x$. The curve passes through the point $B\left(\frac{\pi}{4}, 7\right)$. The line $y = 5$ meets the curve at the points A and C.

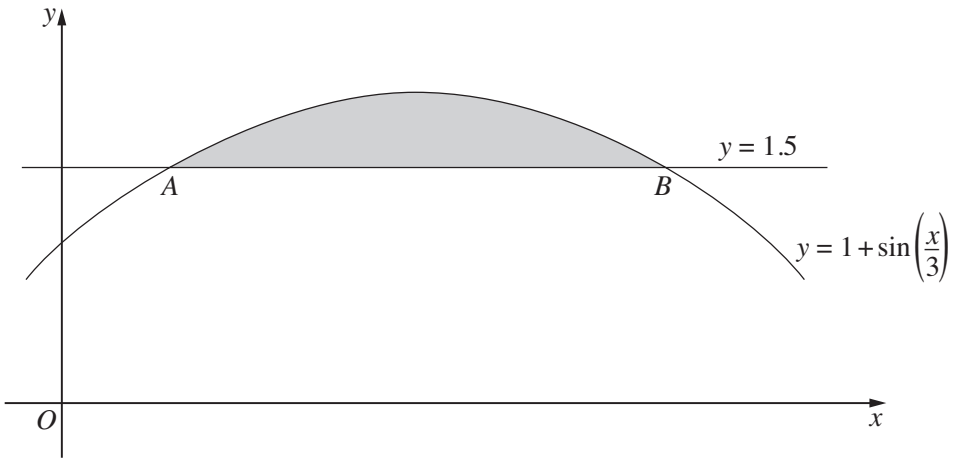
(i) Show that the curve has equation $y = 3 + 4\sin 2x$. [3]

(ii) Find the x-coordinate of the point A and of the point C. [4]

(iii) Find the area of the shaded region. [5]

6) **(i)** State the amplitude of $1 + \sin\left(\frac{x}{3}\right)$. [1]

(ii) State, in radians, the period of $1 + \sin\left(\frac{x}{3}\right)$. [1]

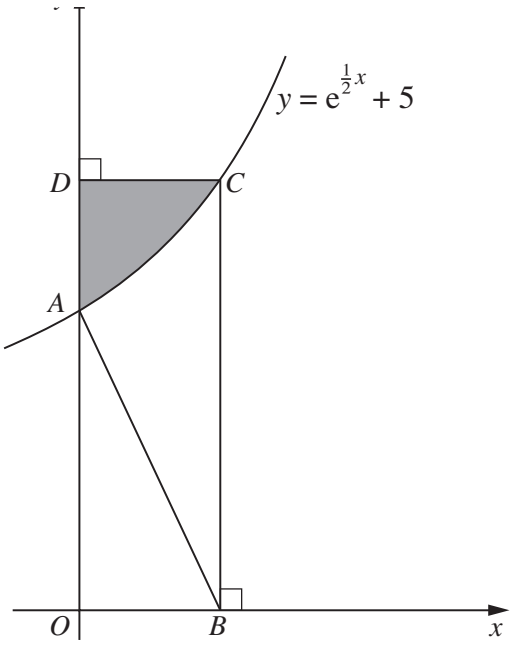


The diagram shows the curve $y = 1 + \sin\left(\frac{x}{3}\right)$ meeting the line $y = 1.5$ at points A and B. Find

(iii) the x-coordinate of A and of B, [3]

(iv) the area of the shaded region. [6]

7)



The diagram shows part of the curve $y = e^{\frac{1}{2}x} + 5$ crossing the y-axis at A. The normal to the curve at A meets the x-axis at B.

(i) Find the coordinates of B. [4]

The line through B, parallel to the y-axis, meets the curve at C. The line through C, parallel to the x-axis, meets the y-axis at D.

(ii) Find the area of the shaded region. [6]