

Topic X3 Calculus (Post-TT B) [40]

1.

(i) Find $\int (4x - 5) dx$. [2]

(ii) The gradient of a curve is given by $\frac{dy}{dx} = 4x - 5$. The curve passes through the point (3, 7). Find the equation of the curve. [3]

(Total 5 marks)

2.

Find the gradient of the curve $y = 2x + \frac{6}{\sqrt{x}}$ at the point where $x = 4$. [5]

(Total 5 marks)

3.

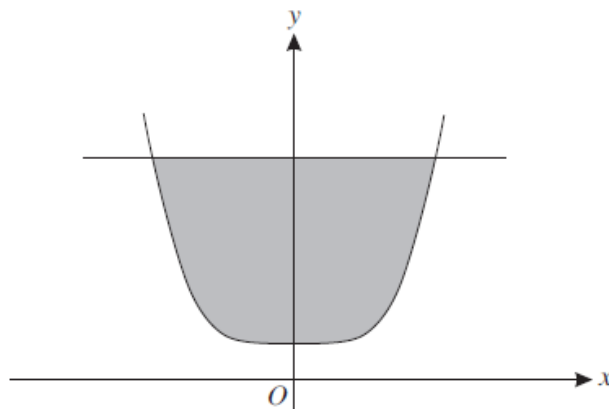
(i) Find the coordinates of the stationary points of the curve $y = 27 + 9x - 3x^2 - x^3$. [6]

(ii) Determine, in each case, whether the stationary point is a maximum or minimum point. [3]

(iii) Hence state the set of values of x for which $27 + 9x - 3x^2 - x^3$ is an increasing function. [2]

(Total 11 marks)

4.



The diagram shows the curve $y = x^4 + 3$ and the line $y = 19$ which intersect at $(-2, 19)$ and $(2, 19)$. Use integration to find the exact area of the shaded region enclosed by the curve and the line. [7]

(Total 7 marks)

5.

The positive constant a is such that $\int_a^{2a} \frac{2x^3 - 5x^2 + 4}{x^2} dx = 0$.

(i) Show that $3a^3 - 5a^2 + 2 = 0$. [6]

(ii) Show that $a = 1$ is a root of $3a^3 - 5a^2 + 2 = 0$, and hence find the other possible value of a , giving your answer in simplified surd form. [6]

(Total 12 marks)