

1. Evaluate $\int_0^1 (x^2 - 1)\sqrt{x} dx$ [5 marks]

2. Find the general solution of the differential equation $x^2 \frac{dy}{dx} = \tan y$. [6 marks]

3. Find $\int \frac{1}{1+e^x} dx$ [7 marks]

4. Use the trapezoidal rule with 6 ordinates to find an approximate value for $\int_0^1 x^2 e^{2x} dx$ to 3 decimal places.

[7 marks]

5. The curve $y = x^2 - 2x + 3$ meets the line $y = x + 1$ at the points P and Q.

a) Find the coordinates of P and Q.

b) Sketch the curve and the line on the same axes. Hence, shade the region bounded by the curves.

c) Find the volume of the solid generated by revolving the region bounded 2π radian about x -axis.

[12 marks]

6. Show that the equation $16x^2 + 4y^2 - 64x - 40y + 100 = 0$ represents an ellipse and find the coordinates of the centre and vertices.

Sketch the ellipse.

[13 marks]

END OF QUESTION

Final Answer

1. $-\frac{8}{21}$

2. $\sin y = Ae^{-\frac{1}{x}}$

3. $\ln\left|\frac{e^x}{1+e^x}\right| + c$ or $-\ln|e^{-x} + 1| + c$

4. 1.695

5. a. $P(1,2)$, $Q(2,3)$ c. $\frac{4}{5}\pi \text{ unit}^3$

6. centre $(2,5)$.

The foci $(2,5 + \sqrt{12})$, $(2,5 - \sqrt{12})$.

The vertices $(2,9)$ and $(2,1)$.