

1. Evaluate $\int_3^4 \frac{4}{x^2 - 4} dx$ [5 marks]
2. Find the coordinates of the center, the length of the major and minor axes for the ellipse $3x^2 + 5y^2 + 6x - 20 = 0$. [6 marks]
3. a) Show that the equation $x^3 - 4x + 2 = 0$ has a root between $x = 1$ and $x = 2$. [3 marks]
- b) Approximate the root to 2 decimal places by using Newton - Raphson Method. [4 marks]
4. Solve $\frac{dy}{dx} + 2y = xe^{-x}$, $y(0) = 3$. [7 marks]
5. (a) Sketch and shade the region R bounded by the curves $y = x^2 + 2$, the line $2y - x = 2$, $x = 0$ and $x = 2$. Hence, find the area of R . [6 marks]
- (b) If the region R in part (a) is rotated through 2π radian about the x -axis, find the volume of the solid generated. [4 marks]
6. Obtain the general equation of a circle with centre at $(3,1)$ and touches the line $x + 2y = 0$. [4 marks]
- a) Find the values of m if $y = mx$ is another tangent of the circle from the origin. [5 marks]
- b) By using the positive value of m , find the intersection point of $y = mx$ and the circle. Find the normal equation at this point. [6 marks]

END OF QUESTION

Final Answer

1. $\ln\left(\frac{5}{3}\right)$ or 0.51

2. $C(-1,0)$ length of major axes = $2\sqrt{\frac{23}{3}}$ length of minor axes = $2\sqrt{\frac{23}{5}}$

3. The root is 1.68.

4. $y = (xe^x - e^x + 4)e^{-2x}$

5. (a) $\frac{11}{3}$ unit² (b) $\frac{102}{5}\pi$ unit³

6. $x^2 + y^2 - 6x - 2y + 5 = 0$

a) $m = -\frac{1}{2}$ or $m = 2$

b) Point of intersection = (1,2)

Equation of normal, $2y + x - 5 = 0$