



- I. (15 pts) Find the length of the following curve:
$$y = x^4 + \frac{1}{32x^2} \quad 1 \leq x \leq 2$$
- II. (10 pts) Find the length of the following curve:
$$x = (y + 1)^{\frac{2}{3}} \quad -1 \leq y \leq 0$$
- III. (15 pts) Find the length of the parametric curve provided below:
$$x = 3 \sin t$$
$$y = 3 \cos t \quad 0 \leq t \leq 2\pi$$
- IV. (15 pts) Find the volume of the solid generated by rotating the region $0 \leq y \leq 1 - x^2$ about the line $y = 1$.
- V. (15 pts) Find the volume of the solid generated by revolving the region bounded by the curves $y = \frac{1 + \sin x}{x}$, $y = \frac{1}{x}$ and the lines $x = 0$ and $x = \pi$ about the y -axis. Use the Shell Method.
- VI. (10 pts) A solid lies between planes perpendicular to the x -axis at $x = 1$ & $x = 4$. Its cross section perpendicular to the x -axis between these planes is an equilateral triangle with base running from $y = \sqrt{x}$ to the axis. Find the volume of this solid.
- VII. (20 pts – 10 pts each) Given $\vec{u} = 2\vec{i} + 4\vec{j}$ & $\vec{v} = 3\vec{i} - 3\vec{j}$
- a) Find $3\vec{u} - 2\vec{v}$
- b) Find $\cos \left(\begin{array}{c} \wedge \\ \vec{u} \quad , \quad \vec{v} \end{array} \right)$