

Name: _____

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30 minutes maximum. No aids (book, calculator, etc.) are permitted. Show all work and use proper notation for full credit. Answers should be in reasonably-simplified form. 25 points possible.

1. Consider the region in the first quadrant bounded by the curves $y = \cos(x^2)$, $y = 0$, $x = 0$.

(a) (4 points) Sketch the region. **Clearly label any important points.**

(b) (9 points) Find the volume of the solid obtained by rotating the region about the y -axis.

2. (6 points) Set up, but **do not evaluate** an integral that computes the arc length of the curve $y = x^4$ from the point $(-1, 1)$ to the point $(1, 1)$.

3. (6 points) Set up, but **do not evaluate** an integral that computes the surface area of the solid obtained by rotating the curve $y = \cos(x)$ over the interval $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$ about the x -axis.

BONUS (2 points) Find the arc length of the curve $y = \sqrt{9 - x^2}$ from the point $(-3, 0)$ to $(0, 3)$. Justify your answer.