**Math 252: Quiz 3** **29 January 2026**

**Name:** _____ / **25**

30 minutes. No aids (book, notes, calculator, internet, etc.) are permitted. Show all work and use proper notation for full credit. Put answers in reasonably-simplified form. 25 points possible.

**1. [8 points]** For each part below, completely set up, **but do not evaluate**, the integral.

**a**. The length of the curve $y = \sin(x^2) + 2$ on the interval $2 \leq x \leq 4$.

**b**. The area of the surface formed by revolving the graph of $y = x^3 + 2$, on the interval $[0, 2]$, around the $x$-axis.

**2. [8 points]**

**a**. Sketch the region bounded by the curves $y = \sin(\pi x^2)$, $y = 0$, $x = 0$, and $x = 1$.

**b**. Set up **and evaluate** an integral to compute the volume of the solid found by rotating the region in **a.** around the $y$-axis. (*Hint. The integral from using washers won't work. Using shells you can do the integral.*)

**3. [9 points]** A team of engineers needs to build a large parabolic radio antenna, a satellite dish like those on West Campus. Their design has a radius of 2 m and a depth of 1 m. They need to know the surface area to determine how much material is needed to build one.

**a**. Rotate the curve $y = \dfrac{x^2}{4}$, $0 \leq x \leq 2$, around the $y$-axis to create the surface. Sketch the curve and the surface.

**b**. Set up **and evaluate** an integral to compute the surface area. Simplify your answer. (*Hint. Yes, you can do the integral!*)

**EC. [1 points]** (**Extra Credit**) If you draw half of a disk on a piece of paper, and cut that out, and roll it into a cone, what's the angle at the point of the cone? (*Hint. No integration needed! Use your geometry and triangle knowledge!*)

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