**Math 252: Quiz 3** **27 January, 2022**

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

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. **[4 points]** Completely set up, but do not evaluate, an integral for the length of the curve $y = \cos(x)$ from $x = -\pi/2$ to $x = \pi/2$.

2. **[3 points]** Evaluate (and simplify) this indefinite integral.

$$\int x^{1/2}\sqrt{1+\frac{1}{x}}\,dx =$$

**3. [9 points]**

**a**. Sketch the region bounded by the curves $y = e^{-x^2}$, $y = 0$, $x = 1$, and $x = 2$.

**b**. Evaluate and simplify an integral for 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. Use shells.*)

**4. [9 points]** A large parabolic radio antenna, a satellite dish like those on West Campus, might have a radius of 4 m and a depth of 1 m. A design engineer would need to know much material is needed to build one, essentially the surface area. For instance, suppose we rotate the curve $y = \dfrac{x^2}{16}$, $0 \leq x \leq 4$ around the $y$-axis to create a surface.

**a**. Sketch the surface.

**b**. Use an integral compute the surface area. Simplify your answer.

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