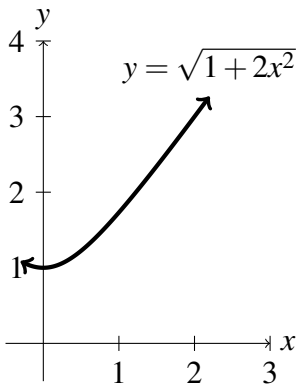
Math 252: Quiz 3 **11 Sept 2025**

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.

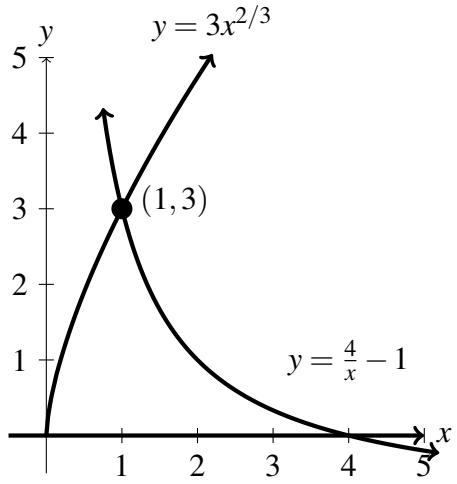
1. (9 points) The region R is bounded by $y = \sqrt{1+2x^2}$, $x = 2$, and the x- and y- axes. Sketch the region R on the graph below and answer the questions.



   (a) (7 points) **Use shells** to find the volume of the solid obtained by rotating the region R about the y-axis. (You must **set-up** an integral and **evaluate** it.)

   (b) (2 points) Give at least one reason why the method of shells might be better than disks or washers for the problem in part (a).

2. (5 points) Suppose the region R is bounded by $y = 3x^{2/3}$, $y = \frac{4}{x} - 1$ and the x-axis. (Graphed below.) **Set up but do not evaluate** an integral for finding the volume of the solid generated by rotating R about the $\boxed{x\text{-axis}}$. **Use shells.**



Formulas: arc length $= \int_a^b \sqrt{1 + (f'(x))^2}\, dx$ surface area $= \int_a^b 2\pi f(x) \sqrt{1 + (f'(x))^2}\, dx$

3. (3 points) **Set up but do not evaluate** an integral to calculate the length of the function $y = \ln(x^2 + 1)$ from $x = 0$ to $x = 10$.

4. (8 points) Find the surface area of the volume generated when the curve $f(x) = \sqrt{4 - x^2}$ from $x = 0$ to $x = 1$ is revolved around the x-axis. (You can evaluate this integral. The points will be distributed as: 5 points to correctly set up the integral and 3 points for the work to correctly evaluate it.)