Show all work clearly and in order, and circle your final answers. Justify your answers algebraically whenever possible. No notes, phones and calculators. You have 25 minutes to take this 10 point quiz.
Please also put your name in the back of the quiz.

Student Name:  

Student ID:  

1. (3 pts) Evaluate the indefinite integral.

\[ \int e^x \sqrt{1 + e^{2x}} \, dx \]

\[ u = 1 + e^x, \quad du = e^x \, dx \]

\[ \int e^x \sqrt{1 + e^{2x}} \, dx = \int u^{\frac{1}{2}} \, du = \frac{2}{3} u^{\frac{3}{2}} + C = \frac{2}{3} (1 + e^x)^{\frac{3}{2}} + C \]

2. (4 pts) Sketch the region enclosed by the given curves and find its area.

\[ y = \cos \pi x, \quad y = 4x^2 - 1 \]

\[ \cos \pi x = 4x^2 - 1 \quad \Rightarrow \quad x = \pm \frac{1}{2} \]

\[ \int_{-\frac{1}{2}}^{\frac{1}{2}} \cos \pi x - (4x^2 - 1) \, dx \]

\[ = \left( \frac{1}{\pi} \sin \pi x - \frac{4}{3} x^3 + x \right) \bigg|_{-\frac{1}{2}}^{\frac{1}{2}} = \frac{2}{\pi} + \frac{2}{3} \]

3. (3 pts) Sketch the bounded region and the solid. Set up the integral to find the volume of the rotating solid (do not need to evaluate.)

\[ y = e^x, \quad y = 0, \quad x = -1, \quad x = 1; \quad \text{about the } x\text{-axis} \]

\[ \int_{-1}^{1} \pi (e^x)^2 \, dx \]