3. [9 points] For each of the following questions, fill in the blank with the letter corresponding to the correct answer from the bottom of the page. No credit will be given for unclear answers.

a. [3 points] The length of the curve $y = \pi e^{-x}$ between $x = 2$ and $x = 4$ is:

_____

b. [3 points] Consider the region bounded by the x-axis, $y = -2e^{-2x}$, $x = 2$, and $x = 4$. The volume of the solid whose base is that region and whose cross sections perpendicular to the x-axis are semicircles is:

_____

c. [3 points] The volume of the solid obtained by rotating the region bounded by $y = e^{-x}$, $y = -2e^{-2x}$, $x = 2$ and $x = 4$, around the y-axis is:

_____

$(A) \int_2^4 \frac{\pi}{2} e^{-4x} dx$

$(B) \int_2^4 \pi(e^{-2x} - 4e^{-4x}) dx$

$(C) \int_2^4 2\pi x(e^{-x} + 2e^{-2x}) dx$

$(D) \int_2^4 \pi\sqrt{1 + e^{-2x}} dx$

$(E) \int_2^4 2\pi e^{-4x} dx$

$(F) \int_2^4 2\pi\sqrt{1 + e^{-4x}} dx$

$(G) \int_2^4 \frac{\pi}{2} e^{-2x} dx$

$(H) \int_2^4 \sqrt{1 + \pi^2 e^{-2x}} dx$

$(I) \int_2^4 2\pi(e^{-2x} - 2e^{-4x}) dx$

$(J) \int_2^4 2\pi(e^{-x} + 2e^{-2x}) dx$