Quiz 8

Name: <u>Solution Key</u>

Answer all questions in a clear and concise manner. Unsupported answers will receive *no credit*.

1. Which of the following integrals correctly computes the arc length of $f(x) = \sqrt[3]{x}$ between $(1,1)$ and $(8,2)$?

   [A] $\int_1^8 \sqrt{1 + \sqrt[3]{x}}\, dx$

   [B] $\int_1^8 \sqrt{1 + \sqrt[3]{x^2}}\, dx$

   [C] $\int_1^8 \sqrt{1 + \dfrac{1}{9x^{4/3}}}\, dx$

   [D] $\int_1^8 \sqrt{1 + \dfrac{1}{3x^{2/3}}}\, dx$

   $f'(x) = \frac{1}{3}x^{-2/3}$

   $S = \int_1^8 \sqrt{1 + f'(x)^2}\, dx$

   $= \int_1^8 \sqrt{1 + \left(\frac{1}{3x^{2/3}}\right)^2}\, dx$

   $= \int_1^8 \sqrt{1 + \frac{1}{9x^{4/3}}}\, dx$

2. Write an integral expression for the surface area of the surface generated by rotating the arc above around the y-axis.

   $SA = \int_a^b 2\pi x\, ds$

   $= \int_1^8 2\pi x \sqrt{1 + \frac{1}{9x^{4/3}}}\, dy$