Name: _____

Directions: Show all work. No credit for answers without work.

1. **[2 points]** Find the derivative of $f(x) = 2^{\tan(x)} - \ln(x^5)$.

2. **[3 points]** Evaluate $\int_0^{\pi/2} \sin(x)\cos(x)\,dx$.

3. **[5 points]** Find integrals for the following quantities. *Do not solve these integrals.*

   (a) The volume of rotation *about the x-axis* of the region bounded by $g(x) = e^{-x}$ and the lines $y = 0$, $x = 0$, and $x = 1$.

   (b) The volume of rotation *about the y-axis* of the region bounded by $g(x) = e^{-x}$, and the lines $y = 0$, $x = 0$, and $x = 1$.

   (c) Which axis of rotation results in a larger volume? Justify your answer.