1. Multiple Choice. Circle the best answer. No partial credit available

(a) (1 point) Find \( \frac{dy}{dx} \), where \( y \) and \( x \) satisfy the implicit equation: \( \sqrt{x} + \sqrt{y} = 9 \)

A. \( \frac{dy}{dx} = -\frac{\sqrt{y}}{x} \)
B. \( \frac{dy}{dx} = \frac{\sqrt{x} - 9}{\sqrt{x}} \)
C. \( \frac{dy}{dx} = (9 - \sqrt{x})^2 \)
D. \( \frac{dy}{dx} = -\frac{1}{2\sqrt{x}} \)
E. None of the above.

Solution:

\[
\frac{\sqrt{x} + \sqrt{y}}{2} = 9
\]
\[
\frac{1}{2\sqrt{x}} + \frac{y'}{2\sqrt{y}} = 0
\]
\[
y' = -\frac{\sqrt{y}}{\sqrt{x}}
\]
\[
y' = \frac{\sqrt{x} - 9}{\sqrt{x}}
\]

(b) (1 point) Find the slope of the tangent line of the graph given by \( \sqrt{x} + \sqrt{y} = 9 \) through the point \((25, 16)\).

A. 16
B. -16
C. -1/10
D. -4/5

Solution: Plut in \( x = 25 \), and \( y = 16 \) into the formula from part (a).
2. (2 points) The top of a 10 foot ladder, leaning against a vertical wall, is slipping down the wall at a rate of 4 feet per second. How fast is the bottom of the ladder sliding along the ground away from the wall when the bottom of the ladder is 6 feet away from the base of the wall?

**Solution:** Consider the pictures

\[
\begin{align*}
\frac{d}{dt} \left( y^2 + x^2 \right) &= 0 \\
2y \cdot y' + 2x \cdot x' &= 0 \\
y \cdot y' + x \cdot x' &= 0 \\
(8)(-4) + (6)x' &= 0 \\
x' &= \frac{16}{3}
\end{align*}
\]