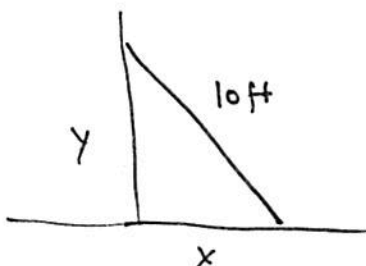


Instructions: Work the problems below as directed. Show all work. Clearly mark your final answers. Use exact values unless the problem specifically directs you to round. Simplify as much as possible. Partial credit is possible, but solutions without work will not receive full credit.

1. A 10 ft ladder is leaning against a wall and starts to slide away from the wall at a rate of $\frac{dx}{dt} = 0.5 \frac{ft}{sec}$. How fast is the top of the ladder sliding down the wall when the foot of the ladder is three feet from the wall?



$$x^2 + y^2 = 10^2$$

$$2x \frac{dx}{dt} + 2y \frac{dy}{dt} = 0$$

$$x = 3$$

$$9 + y^2 = 10^2$$

$$y^2 = 100 - 9 = 91$$

$$y = \sqrt{91}$$

$$2(3)(0.5) = -2(\sqrt{91}) \frac{dy}{dt}$$

$$3 = -2(\sqrt{91}) \frac{dy}{dt}$$

$$\frac{3}{-2\sqrt{91}} = \frac{dy}{dt} \approx -0.157$$

2. Use differentials (linear approximations) to estimate the value of $\sqrt{64.05}$.

$$y = \sqrt{x}$$

$$\Delta y \approx \frac{1}{2\sqrt{x}} \Delta x$$

$$\Delta x = 0.05$$

$$x = 64$$

$$\Delta y = \frac{1}{2\sqrt{64}} (0.05) = \frac{1}{2 \cdot 8} (0.05) = \frac{1}{16} (0.05) = 0.003125 = \frac{1}{320}$$

$$y(64.05) \approx y(64) + \Delta y = 8 + \frac{1}{320} = \boxed{8.003125}$$

The true value (from calculator) is 8.003124939