

9. Find  $dy/dx$  by implicit differentiation when  $x \tan(y) = y - 1$ .

8 pts

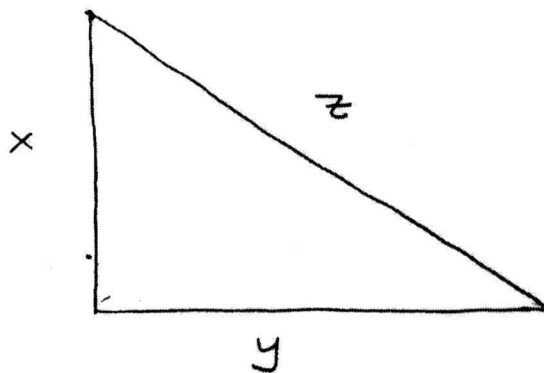
$$x \sec^2 y \cdot y' + \tan y \cdot 1 = y'$$

$$y' (x \sec^2 y - 1) = -\tan y$$

$$y' = \frac{-\tan y}{x \sec^2 y - 1}$$

10. A balloon is rising at a constant speed of 5 ft/s. A boy is cycling along a straight road at a constant speed of 15 ft/s. When he passes under the balloon, it is 45 ft above him. How fast is the distance between the boy and the balloon increasing, three seconds later?

8 pts



↓

$$dx/dt = 5 \text{ ft/s.}$$

$$dy/dt = 15 \text{ ft/s.}$$

$$x = 45 + 5 \cdot 3 = 60 \text{ ft.}$$

$$y = 15 \cdot 3 = 45 \text{ ft}$$

$$z = \sqrt{60^2 + 45^2} = 75 \text{ ft.}$$

$$dz/dt = ?$$

$$x^2 + y^2 = z^2$$

$$2x \cdot dx/dt + 2y \cdot dy/dt = 2z \cdot dz/dt$$

$$60 \cdot 5 + 45 \cdot 15 = 75 \cdot dz/dt$$

$$dz/dt = \frac{300 + 675}{75} = 13 \text{ ft/sec.}$$