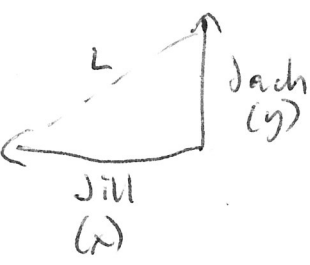


AP Calculus Study Guide: section 3.11

Jack and Jill are talking, on jet skis in the middle of a lake. They part company and Jack heads due north at 500 ft/min. Jill heads due west at 600 ft/min. After 1 minute, how quickly is the distance between Jack and Jill growing?



Jack is 500 ft north, Jill is 600 ft west.
 Distance between them is $\sqrt{500^2 + 600^2}$
 $= 781.024$ ft

$$x^2 + y^2 = L^2 \rightarrow x \frac{dx}{dt} + y \frac{dy}{dt} = L \frac{dL}{dt}$$

$$600(600) + 500(500) = 781.024 \frac{dL}{dt}$$

$$\frac{610,000}{781.024} = \frac{dL}{dt} = 781.024 \text{ ft/min}$$

answer: _____

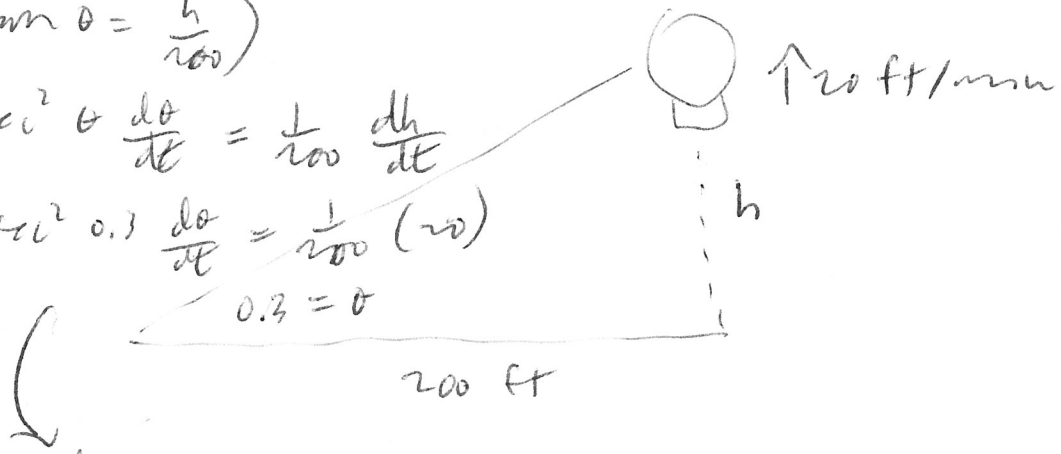
A hot air balloon is rising on a calm day at 20 ft/min. A spectator stands 200 ft. from where the balloon took off, and the angle between her line of sight and the horizontal is 0.3 radians. If the spectator continues to observe the balloon, how quickly is this angle changing?

$$\frac{d}{dt} (\tan \theta = \frac{h}{200})$$

$$\sec^2 \theta \frac{d\theta}{dt} = \frac{1}{200} \frac{dh}{dt}$$

$$\sec^2 0.3 \frac{d\theta}{dt} = \frac{1}{200} (20)$$

$$0.3 = \theta$$



$$\frac{d\theta}{dt} = \frac{1}{10} \cdot 0.912 = 0.0912 \frac{\text{rad}}{\text{min}}$$

answer: _____