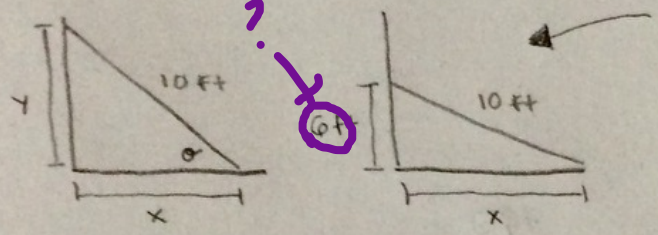
QUESTION - +4 EC

#12. Concider a ladder 10 ft long leaning against a vertical wall. If the bottom of the ladder slides away from the wall at a rate of ~~1.25 ft/s~~, how fast is the angle between the ladder and the ground changing when the bottom of the ladder is ~~6 ft~~ from the wall?



Looking for $\left.\frac{d\theta}{dt}\right|_{x=6}$:)

$\cos\theta = \frac{x}{10}$ ← SohCahToa

$\frac{d}{dt}\left(\cos\theta = \frac{x}{10}\right)$

Chain Rule = $f'(g(x)) \cdot g'(x)$
$\theta = g(x)$
$\cos u = f(u)$
$g' = \frac{d\theta}{dt}$
$f'(u) = -\sin u$

Good!

$\frac{\frac{dx}{dt}}{10} = -\sin(\theta) \cdot \frac{d\theta}{dt}$ ✓ ✓ ✓

$\frac{-1.25}{10} = -\sin(\theta)\frac{d\theta}{dt}$

$-\frac{(0.125)}{\sin\theta} = \frac{d\theta}{dt}$

$-\frac{0.125}{.8} = \left.\frac{d\theta}{dt}\right|_{x=6}$

$\sin^2\theta + \cos^2\theta = 1$
$\sin^2\theta = 1 - \cos^2\theta$
$\sin^2\theta = 1 - (3/5)^2$
$\sin^2\theta = 1 - 9/25 = 16/25$
$\sin\theta = 4/5 = .8$ ✓

when $x=6$, $\cos\theta = \frac{6}{10}$

$\left.\frac{d\theta}{dt}\right|_{x=6} = -0.15625$ ✓

★ Angle decreases at 0.15625 radians per second!