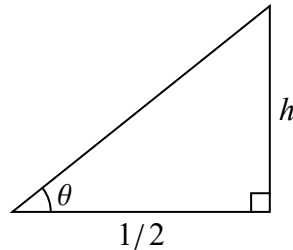# Math 1110, Sec. 08

Name: SOLUTION

# Quiz 6

Consider the following right triangle.



(a) **[3 points]** Write a formula for the angle $\theta$ as a function of $h$.

$$\tan \theta = \frac{h}{1/2}$$

So $\boxed{\theta = \tan^{-1}(2h)}$

so $\tan \theta = 2h$

(b) **[3 points]** Take the derivative of your formula from part (a) with respect to $t$.

$$\frac{d\theta}{dt} = \frac{1}{1 + (2h)^2} \, 2 \frac{dh}{dt}$$

which simplifies to $\boxed{\dfrac{d\theta}{dt} = \dfrac{2}{1 + 4h^2} \dfrac{dh}{dt}}$

(c) **[4 points]** Suppose $h$ is increasing at a rate of 0.1 units/min. How quickly is $\theta$ increasing when $h = 1$?

$$\frac{d\theta}{dt} = \frac{2}{1 + 4(1)^2} (0.1)$$

$$= \frac{2}{5}(0.1) = \boxed{0.04 \text{ rad/min}}$$