

## Practice Problems for Exam #2

1. a) Evaluate  $\lim_{x \rightarrow 0} \frac{\tan x}{4x}$

b) Find  $dy/dx$  and  $d^2y/dx^2$  if  $y = x \tan x - \sin^2 x$ .

2. A 13 foot ladder leaning up against a wall is sliding down the wall at 1 foot per second. The ladder makes an angle  $\theta$  with the ground. How is this angle  $\theta$  changing when the top of the ladder is five feet from the ground?

3. Find an equation for the tangent line to the curve  $y^2 = 2x^2 - xy$  at the point  $(1, 1)$

4. Use differentials to approximate  $\sin(\pi/2 - .01)$ .

5. Graph  $y = 2 \sec^2(2x)$  and  $y = \frac{\tan(2x+2h) - \tan(2x)}{h}$  for  $h = .1, .01$  and  $-.001$  together on the same screen. (Use  $-\pi/6 \leq x \leq \pi/6$ .) What do you see? Can you explain what's going on?