MAT 170 Section 005

September 12, 2005

Names _____

Please work in groups with no more than four people and complete this worksheet during class. Hand in one worksheet for each group.

1. Let $f(x) = x^2 + 1$.

   (a) Find the slope of the tangent line at any point x on the graph, i.e. calculate

   $$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}.$$

   (b) Find the slope of the tangent line at $x = 2$, i.e. calculate

   $$\lim_{h \to 0} \frac{f(2+h) - f(2)}{h}.$$

2. Use the formula $A = \pi r^2$ for the area of a circle to find

   (a) the average rate at which the area of a circle changes with t as the radius increases from $r = 1$ to $r = 2$, i.e. calculate $\dfrac{\triangle A}{\triangle r}$ over the interval $r \in [1, 2]$.

   (b) the instantaneous rate at which the area changes with r when $r = 2$, i.e. calculate

$$\lim_{\triangle r \to 0} \frac{\triangle A}{\triangle r}.$$

3. If a rock, initially at rest is dropped from a height of 400 ft its height after t seconds is given by $s(t) = -16t^2 + 400$. How long does it take to hit the ground and what is its velocity at impact?