Math 105 - Quiz 2 - September 18, 2006

Instructions: Show all of your work and circle your final answers. Calculators are allowed, but notes and books are not.

1. (10 pts.) Suppose that the slope of the curve $y = f(x)$ at $x = 3$ is 4, and that $f(3) = 1$.
   
   (a) Find $f'(3)$.
   
   (b) Find the equation of the tangent line to the curve at $(3,1)$.

   \[ f'(3) = 4 \]

   \[
   \begin{align*}
   \text{b)} & \quad \text{pt} = (3,1), \quad \text{slope} = 4. \\
   & \quad y - y_0 = m(x - x_0) \\
   & \quad y - 1 = 4(x - 3) \\
   & \quad y - 1 = 4x - 12 \\
   & \quad y = 4x - 11
   \end{align*}
   \]

2. (10 pts.) Let $g(x) = |x|$.
   
   (a) Find $g'(3)$.
   
   (b) Find $g'(-4)$.
   
   (c) Explain why $g'(0)$ doesn’t exist. (A picture may help.)

   \[ g'(3) = 1. \quad \text{(for } x > 0, \text{ graph of } y = |x| \text{ is the same as the graph of } y = x, \text{ which has slope } 1.) \]

   \[ g'(-4) = 1. \quad \text{(for } x < 0, \text{ } |x| = -x, \text{ so the slope is } -1.) \]

   \[
   \begin{align*}
   \text{c)} & \quad y = |x| \\
   & \quad \text{No matter how much one zooms in,} \\
   & \quad \text{there is always a kink in the graph.} \\
   & \quad \text{It never "flattens out." So } f'(0) \text{ doesn't exist.}
   \end{align*}
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