

Math 171 - Quiz 3

September 18, 2014

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (6 points) Let $f(x) = 1/x$. Use the limit definition of derivative to determine $f'(x)$.

$$\begin{aligned} f'(x) &= \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{\frac{1}{x+h} - \frac{1}{x}}{h} = \lim_{h \rightarrow 0} \frac{\frac{x - (x+h)}{x(x+h)}}{h} \\ &= \lim_{h \rightarrow 0} \frac{-h}{x(x+h)} \cdot \frac{1}{h} = \lim_{h \rightarrow 0} \frac{-1}{x(x+h)} = \boxed{\frac{-1}{x^2}} \end{aligned}$$

2. (2 points) Given the following table of values, find an equation for the line tangent to the graph of g at the point where $x = 2$.

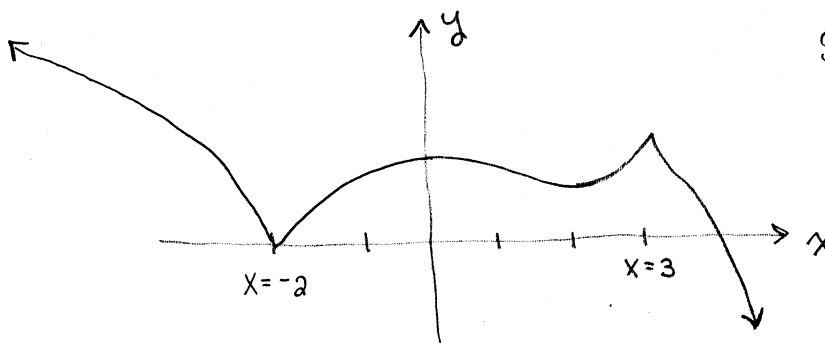
x	0	1	2	3	4
$g(x)$	0	1.5	-0.8	-4.0	-2.6
$g'(x)$	2.6	-0.3	-3.8	-1.4	3.9

$$\text{Slope} = g'(2) = -3.8$$

$$\text{Point} = (2, g(2)) = (2, -0.8)$$

$$y + 0.8 = -3.8(x - 2) \quad \text{or} \quad y = -3.8x + 6.8$$

3. (2 points) Sketch the graph of a function that is continuous everywhere but is not differentiable at $x = -2$ and $x = 3$.



SHARP POINTS
AT $x = -2$
AND $x = 3$.