

**Math 157 - Quiz 5**  
September 30, 2015

Name key Score \_\_\_\_\_

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

1. (3 points) Let  $f(x) = \frac{x}{x-1}$ . It can be shown that  $f'(x) = \frac{-1}{(x-1)^2}$ . Use this information to find an equation of the line tangent to the graph of  $f$  at the point where  $x = 2$ .

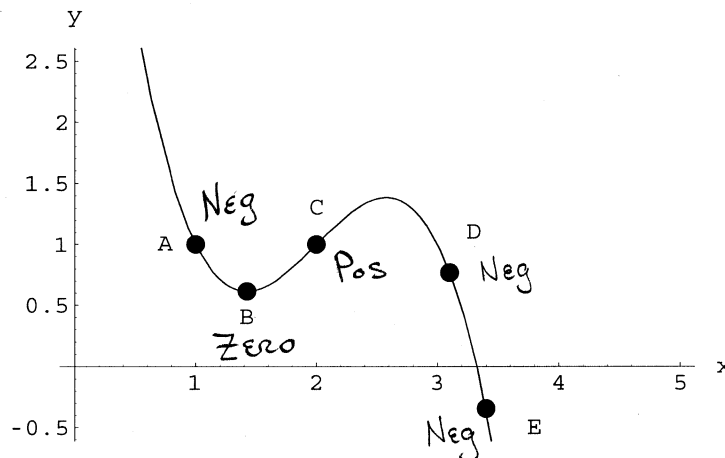
$$\begin{aligned}
 M = f'(a) &= \frac{-1}{(2-1)^2} = -1 \\
 x = a \Rightarrow y = f(a) &= \frac{2}{2-1} = 2
 \end{aligned}
 \left. \vphantom{\begin{aligned} M = f'(a) \\ x = a \end{aligned}} \right\} \begin{aligned} y &= -1x + b \\ 2 &= -1(2) + b \Rightarrow b = 4 \end{aligned}$$

$y = -x + 4$

2. (3 points) The function  $g(x)$  is a linear function whose graph passes through the origin. Determine a formula for the function  $g$  if  $g'(1) = 5$ .

$$\begin{aligned}
 \text{LINEAR FUNC WITH } g'(1) = 5 &\Rightarrow g(x) = 5x + b \\
 \text{GRAPH PASSES THROUGH } (0,0) &\Rightarrow b = 0
 \end{aligned}
 \left. \vphantom{\begin{aligned} \text{LINEAR FUNC} \\ \text{GRAPH PASSES} \end{aligned}} \right\} \boxed{g(x) = 5x}$$

3. (3 points) The graph of the function  $h$  is shown below. Determine whether  $h'(x)$  is negative, positive, or zero at each of the indicated points.



4. (1 point) Refer back to problem #1. Find the instantaneous rate of change of  $f$  at  $x = 3$ .

$$f'(3) = \frac{-1}{(3-1)^2} = \boxed{-\frac{1}{4}}$$