NAME _____ JUNE 29, 2018

Instructions: *Include all relevant work to get full credit.*

Quiz #5

1. Calculate the slope of the tangent line to the curve $y = 3\sqrt{x}$ at $x = 4$ using the limit definition. Then obtain the equation of the tangent line. [3]

2. If a ball is thrown into the air with an initial velocity of 60 ft/s, its height (in feet) after t seconds is given by $y = 60t - 3t^2$.

a. Use the limit definition to derive the (instantaneous) velocity function $v(a)$. [2]

b. Use the function you obtained in part (a) to evaluate the velocity at time $a = 12$ seconds. Explain the meaning of this value in the context of the problem. Is the rock moving upwards or downwards at that time? [2]

3. Let

$$f(x) = \begin{cases} x^2 - 2x, & x \leq 5 \\ 3x, & x > 5 \end{cases}$$

Determine if $f(x)$ is differentiable at $x = 5$. [3]