

Math 157 - Quiz 6

October 7, 2015

Name key

Score _____

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

1. (4 points) Determine the derivative of each function.

(a) $f(x) = 5x^3 - 6x^2 + 7x - 13$

$$f'(x) = 15x^2 - 12x + 7$$

(b) $g(x) = x - \sqrt[5]{x} + \frac{7}{x^4} = x - x^{1/5} + 7x^{-4}$

$$g'(x) = 1 - \frac{1}{5}x^{-4/5} - 28x^{-5} = 1 - \frac{1}{5\sqrt[5]{x^4}} - \frac{28}{x^5}$$

2. (4 points) Find an equation of the line tangent to the graph of $y = 1 + \sqrt{x}$ at the point where $x = 4$.

Point: $x = 4, y = 1 + \sqrt{4} = 3$

Slope: $\frac{dy}{dx} = \frac{1}{2}x^{-1/2}$

$$m = \left. \frac{dy}{dx} \right|_{x=4} = \frac{1}{2}(4)^{-1/2} = \frac{1}{4}$$

Line:

$$y = \frac{1}{4}x + b$$

$$3 = \frac{1}{4}(4) + b \Rightarrow b = 2$$

$$y = \frac{1}{4}x + 2$$

3. (2 points) Let $h(x) = x^3 - 3x^2 + 7x$. Find $h''(x)$. Then determine whether the graph of h is concave up or down at $x = -1$.

$$h'(x) = 3x^2 - 6x + 7$$

$$h''(x) = 6x - 6$$

$$h''(-1) = 6(-1) - 6 = -12 < 0$$

\Rightarrow Graph is CONCAVE DOWN