

**Extra Practice before Quiz**  
**Unit 5 ICM Derivatives**

Name: Key Fall '18  
Period: \_\_\_\_\_

**Show your work for credit.**

1. Find the derivative of  $f(x) = \sqrt{x-7}$ . You must show all work using the limit definition. If you find the derivative using the power rule only, you will NOT receive credit!!

$$\lim_{h \rightarrow 0} \frac{(\sqrt{x+h-7} - \sqrt{x-7})(\sqrt{x+h-7} + \sqrt{x-7})}{h(\sqrt{x+h-7} + \sqrt{x-7})}$$

multiply conjugate to top + bottom

$$\lim_{h \rightarrow 0} \frac{(\sqrt{x+h-7})^2 + (\sqrt{x+h-7})(\sqrt{x-7}) - (\sqrt{x-7})(\sqrt{x+h-7}) - (\sqrt{x-7})^2}{h(\sqrt{x+h-7} + \sqrt{x-7})}$$

$$\lim_{h \rightarrow 0} \frac{x+h-7 - (x-7)}{h(\sqrt{x+h-7} + \sqrt{x-7})} = \lim_{h \rightarrow 0} \frac{\cancel{x} + h - \cancel{7} - \cancel{x} + \cancel{7}}{h(\sqrt{x+h-7} + \sqrt{x-7})} = \lim_{h \rightarrow 0} \frac{h}{h(\sqrt{x+h-7} + \sqrt{x-7})}$$

$$\lim_{h \rightarrow 0} \frac{1}{\sqrt{x+h-7} + \sqrt{x-7}} = \frac{1}{\sqrt{x-7} + \sqrt{x-7}}$$

$$\frac{1}{2\sqrt{x-7}}$$

2. Using the Power Rule, find the derivative of  $f(x)$ . Express your answer using positive whole exponents and radicals.

$$f(x) = 3\sqrt{x} - \frac{7}{x^4} + 6\sqrt[4]{x^3} + 8x - 11 = 3x^{1/2} - 7x^{-4} + 6x^{3/4} + 8x - 11$$

$$f'(x) = \frac{3}{2}x^{-1/2} + 28x^{-5} + \frac{9}{2}x^{-1/4} + 8$$

$$f'(x) = \frac{3}{2\sqrt{x}} + \frac{28}{x^5} + \frac{9}{2\sqrt[4]{x}} + 8$$

3. Find the equation of the line tangent to the function using the given info. Show your work.

$$f(x) = 6x^3 + 4 - x \text{ when } x = 2$$

$$f'(x) = 18x^2 - 1$$

$$f'(2) = m = 18(2)^2 - 1 = 72 - 1$$

$$m = 71$$

$$y_1 = f(2) = 6(2)^3 + 4 - 2$$

$$y_1 = 48 + 4 - 2$$

$$y_1 = 50$$

point was (2, 50)

$$y - y_1 = m(x - x_1)$$

$$y - 50 = 71(x - 2)$$

Point-slope Form

$$y = 71x - 92$$

or  
slope-intercept Form