

Math 105 Quiz 3

~~§ 3.1~~ **Key**
Name:

Show all work for credit.

1. Find the derivative of $f(x) = \sqrt{x-2}$ using the formal definition of the derivative.

Use $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$.

$$f'(x) = \lim_{h \rightarrow 0} \frac{\sqrt{(x+h)-2} - \sqrt{x-2}}{h} \cdot \frac{\sqrt{(x+h)-2} + \sqrt{x-2}}{\sqrt{(x+h)-2} + \sqrt{x-2}}$$

$$= \lim_{h \rightarrow 0} \frac{(x+h)-2 - (x-2)}{h(\sqrt{x+h-2} + \sqrt{x-2})} = \lim_{h \rightarrow 0} \frac{h}{h(\sqrt{x+h-2} + \sqrt{x-2})} = \frac{1}{2\sqrt{x-2}}$$

2. Use the sum/difference, constant multiple, and power rules to evaluate the following.

(a) $\frac{d}{dx}(3\sqrt{x} - \pi + \frac{2}{x^4} - 4x^7 + x^{3/5}) = \frac{d}{dx}(3x^{1/2} - \pi + 2x^{-4} - 4x^7 + x^{3/5})$

$$= \frac{3}{2}x^{-1/2} - 8x^{-5} - 28x^6 + \frac{3}{5}x^{-2/5} = \frac{3}{2\sqrt{x}} - \frac{8}{x^5} - 28x^6 + \frac{3}{5\sqrt[5]{x^2}}$$

- (b) Simplify the function before finding the derivative.

$$\left(\frac{(x-1)(x-2)}{x}\right)' = \left(\frac{x^2 - 3x + 2}{x}\right)' = \left(x - 3 + \frac{2}{x}\right)'$$

$$\left(x - 3 + 2x^{-1}\right)' = 1 - 2x^{-2} = 1 - \frac{2}{x^2}$$

3. If you haven't done so already, use your algebra skills to rewrite your answers from 2.(a) and 2.(b) so that there are no negative exponents or fraction exponents.

2(a) (see (a))

2(b) (see (b))