Panther ID: _____ **NAME:** _____

MAC 2311: Worksheet Sep. 22, 2016

1) Compute the derivative of the given function from the limit definition:
a) $f(x) = \frac{1}{x}$
b) $f(x) = \sqrt{x}$

2) Compute the derivatives of the following functions (you don't need to use the limit definition):
a) $f(x) = 4\sqrt{x} - 7x^2 + 13$
b) $f(x) = 13x^5 - \frac{7}{x} + 12x$

3) For the given $f(x)$, compute the indicated higher derivative
a) For $f(x) = x^5 - 7x + 2$, compute $f^{(4)}(x)$
b) For $f(x) = x^{15}$, compute $\frac{d^3 f}{dx^3}$
c) For $f(x) = x^n$, where n is a positive integer, what is the k-th derivative $f^{(k)}(x)$ if $k > n$? What is $f^{(n)}(x)$?

4) Compute the following derivatives. Do not simplify your answer.

a) $\frac{d}{dx}\left((x^2-3x+2)(x^3-4x^2+5)\right)$

b) $\frac{d}{dx}\left((\sqrt{x}-7)(\frac{5}{x}-7x+10)\right)$

5) Compute the following derivatives. Do not simplify your answer.

c) $\frac{d}{dx}\left(\frac{x^7-3x+1}{5x+2}\right)$

d) $\frac{d}{dx}\left(\frac{\sqrt{x}-1}{\sqrt{x}+1}\right)$

6) Prove that the power law, $(d/dx)(x^n) = nx^{n-1}$ holds when n is a negative integer by combining the quotient law and the power law for positive integers.