Math 111, Section 01, Fall 2014

Worksheet 4, Tuesday, September 30, 2014

1. Compute the derivative of $f(x) = \sqrt{x}$ using two methods.

   (a) First use the limit definition of the derivative.

   (b) Second, use the power rule. Check the answers agree.

2. Compute $\dfrac{dy}{dx}$ where $y = \dfrac{5}{6}x + x^{\frac{5}{6}} + \dfrac{1}{x^{\frac{5}{6}}} + \dfrac{5}{6x} + 5x^6 - \dfrac{1}{6x^5} + x^{\frac{5}{6}} \cdot x^{\frac{6}{5}}$.

3. Compute $f'(x)$ where $f(x) = 5x^2 - \sqrt{x} + x^{\frac{5}{7}} + \dfrac{3}{x} - \dfrac{2}{x^2} + \dfrac{1}{\sqrt{x}}$.

4. Compute the second derivative $f''(x)$ where $f(x) = (x^4 - 5x^3 + 6)\sqrt{x}$.

5. Compute the derivative of $f(x) = \dfrac{\sqrt{x} - \dfrac{1}{x^8}}{x^7}$.

6. Let $g(x) = \dfrac{x}{1 + 3x^2}$.

   (a) Compute $g'(x)$.

   (b) Find the point(s) where the curve $y = g(x)$ has horizontal tangent line(s).

7. Consider $f(x) = \dfrac{7x - x^{\frac{7}{8}}}{x^{\frac{1}{4}} - 6x^2}$. Show that $f'(x) = \dfrac{\dfrac{21}{4}x^{\frac{1}{4}} - \dfrac{5}{8}x^{\frac{1}{8}} + 42x^2 - \dfrac{27}{4}x^{\frac{15}{8}}}{(x^{\frac{1}{4}} - 6x^2)^2}$.

Turn in solutions.