Math 157 - Quiz 5

September 25, 2013

Name ___key___

Score _____

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

1. (5 points) Use the basic differentiation rules to determine each derivative.

(a) $\frac{d}{dx}\left(6x^2 + 7x^{-2} - 8x^{1/4}\right) = 12x - 14x^{-3} - 2x^{-3/4}$

$= 12x - \frac{14}{x^3} - \frac{2}{\sqrt[4]{x^3}}$

(b) $\frac{d}{dt}\left(\frac{2}{t^5} + \sqrt{t}\right) = \frac{d}{dt}\left(2t^{-5} + t^{1/2}\right) = -10t^{-6} + \frac{1}{2}t^{-1/2}$

$= \frac{-10}{t^6} + \frac{1}{2\sqrt{t}}$

2. (2 points) Find the x-coordinates of the points where $f'(x) = 0$.

$$f(x) = \frac{1}{3}x^3 + \frac{1}{2}x^2 - 6x + 2$$

$f'(x) = x^2 + x - 6 = 0$

$\Rightarrow (x+3)(x-2) = 0$

$x = -3, \quad x = 2$

3. (3 points) Find an equation of the line tangent to the graph of $y = x^3 - 5x + 1$ at the point where $x = 1$.

$\frac{dy}{dx} = 3x^2 - 5$

$m = \frac{dy}{dx}\bigg|_{x=1} = 3(1)^2 - 5 = 3 - 5 = -2$

POINT: $x = 1 \Rightarrow y = (1)^3 - 5(1) + 1 = 1 - 5 + 1 = -3$

TANGENT LINE: $y + 3 = -2(x-1)$

OR $y = -2x - 1$