Math 1210: Recitation Test #1 Winter 2012

Name:	**A#:**

1. Consider the function $f(x) = \dfrac{2}{5x} - 1$.

   (a) Use the **limit definition** to find the derivative $f'(x)$.

   (b) Find the equation of the tangent line to the curve $y = f(x)$ at $x = 1$.

2. Find $\dfrac{dy}{dx}$. **Do not** simplify your answers.

(a) $y = 3^x - 2x^5 + \dfrac{3}{5\sqrt[4]{x}} + \dfrac{1-x^2}{3} + \dfrac{5}{7x^3} + 5\tan x + 4\sqrt{\pi}$

(b) $y = \sin^4(3x) + 2\sec^3(x^4)$

(c) $y = e^{3\sqrt{x}}(1+3x^3)^5$

(d) $y = \sqrt[3]{\dfrac{\cos 2x}{1+xe^{x^2}}}$

3. Point P lies somewhere on a straight line that runs east to west. A particle travels along this line, beginning at time $t = 0$, such that its displacement from a fixed point P at time $t \geq 0$ is given by the formula

$$d(t) = \frac{t^2 - t + 7}{t^2 - 2t + 9}.$$

(Positive values of $d(t)$ indicate positions to the *east* of P. Time is measured in seconds and distance in metres.)

(a) Find the average velocity of the particle in the first 2 seconds of travel.

(b) What is the instantaneous velocity of the particle at time $t = 2$?

(c) At what time(s) t is the particle stationary (i.e. has velocity 0)?

(d) What is the total distance traveled by the particle in the first 5 seconds?