Math 1210: Recitation Test #1 Winter 2012

Name:	**A#:**

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

   (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 $x = 2$.

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

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

(b) $y = e^{x^2}(1+5x^4)^3$

(c) $y = \dfrac{\sin 3x}{1+x^2e^{2x}}$

(d) $y = \sqrt{\sec^4(2x) + 3\cos^2(x^4)}$

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

$$d(t) = \frac{t^2 + 5t + 13}{t^2 + 4t + 12}.$$

(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 6 seconds?