Calculus I; Fall 2007

Part I

Part I consists of 6 questions, each worth 5 points. Clearly show your work for each of the problems listed.

(1) Find the equation of the tangent line to the graph of
$y = 3x^2 + 2x + 5$ at $x = 1$.

(2) If $y = x\sin(x)$, find y'.

(3) If $y = \sqrt[3]{x^4 + x^2 + 1}$, find y'.

(4) If $y = \frac{x^2+1}{x^2-1}$, find y'. Simplify your answer.

(5) If $y = \frac{x^7-3x^3+x}{\sqrt{x}}$, find y'. Simplify your answer.

(6) If $y = \sin(\tan(x^3+1))$, find y'. [You don't need to simplify the answer.]

Part II

Part II consists of 5 problems each worth 14 points. You must show the relevant steps (as we did in class) and justify your answer to earn credit

(1) Find all the x-values at which the the the tangent line to the graph of $y = 2x^3 - 3x^2 - 36x$ is horizontal.

(2) If a particle moves along the graph of $y = \sin(2x) + \sec(x)$ so that its x-coordinate is **decreasing** at a rate of $3m/s$, how fast is its y-coordinate changing when $x = \pi/3$?

(3) If a flash light is located on the ground $10m$ from a building and shines a light on a man who is 2m tall and walks towards the building at a speed of $.2m/s$, how fast is the length of his shadow on the wall of the building changing when he is 3m from the building?

(4) Find y' if $x^2 + y^2 = \cos(xy)$.

(5) Find y' if $y = \frac{\sqrt{x^2+1}}{x^2-1}$. Simplify your answer.