MATH 148 EXAM 2 OCTOBER 12, 2011
NAME:

INSTRUCTIONS: Partial credit may be given for partial answers: always **show your work**. You are not required to simplify your answers. Calculators, notes, books, and cell phones are not allowed. Please ask the teacher for clarification if needed.

1. Differentiate the function $f(x) = \frac{x^3}{x^2+3}$.

2. Find the slope of the tangent line to the graph of $f(x) = (x-1)^2(x+1)^2$ at the point $(2, 9)$.

3. Find the second derivative of $f(x) = x^3 - 2x^2 + 7x$.

4. Find the second derivative of $f(x) = (x^2 - 1)^5$.

5. Find $\frac{dy}{dx}$ when $x^2 - 5xy + y^2 = 10$.

6. Find $\frac{dy}{dx}$ when $x^{-2} - y^{-1} = 5$

7. Find the relative extrema of the function $f(x) = x^3 + \frac{3}{2}x^2 - 6x$. Clearly label each relative extreme as a maximum or a minimum.

8. Find the relative extrema of the function $f(x) = \frac{1}{4}x^4 - \frac{4}{3}x^3 + 2x^2 + 3$. Clearly label each relative extreme as a maximum or a minimum.

9. A cylindrical keg is being emptied of beer at a rate of 0.5 cubic feet per minute. The volume of beer in the keg is $V = \pi h$ cubic feet when the level of the beer is h feet. Find the rate of change of the beer level $(\frac{dh}{dt})$.

10. Special Agent Fox Mulder is caught in the levitation beam of a small flying saucer. Agent Mulder is rising toward the saucer at a rate of 2 m/s. You are standing 4 meters away on the ground. How fast is Agent Mulder moving away from you $(\frac{dx}{dt})$ when he is 3 meters above the ground?