Business Calculus, Summer 2004

Homework #4

Due: Tuesday, July 27th, 2004 by end of class

1. Find all the critical points of
   (a) $f(x) = \frac{x}{x^2+1}$
   (b) $g(x) = \frac{16}{x} - x^2$
   (c) $h(x) = 2x\sqrt{3x^2+1}$
2. Find the second derivatives $f''(x)$ of
   (a) $f(x) = x^2 e^{-x}$
   (b) $f(x) = \sqrt{1-x^2}$
   (c) $f(x) = x \ln x$
3. Use the first derivative test to find all the critical points of the following functions. Then use the first derivative sign test or the second derivative test to classify them as maxes, mins or "nothing" points:
   (a) $f(x) = \frac{4-x}{x^2+1}$
   (b) $g(x) = 3x^2 - x^3$
   (c) $h(x) = (x^2+1)e^{-x}$
4. A private jetliner travels at a constant speed of v miles per hour. Fuel charges are $0.01v^2$ dollars per hour. Salary for the crew and the cost of renting the jet amount to \$1600 per hour. Find the speed v that minimizes the total cost (fuel plus salaries and rental) of a 3000-mile trip.
5. A store offering a certain brand of lawnmower for p dollars can sell $500 - 2p$ of them. Each lawnmower costs the store \$125. What price yields maximum profit?
6. A rancher wants to build four adjacent cattle stalls in one large rectangle that encloses a total area of 50,000 square feet. How should the length x and the width y of the large rectangle be chosen to minimize the total amount of fencing required?