Math1210 Weekly Assignment 6 (Min-max, Incr./Decr., Concavity - 3.1, 3.2)

Spring, 2016

Uid number:______________________

name:____________________________

Instructions: Please show all of your work as partial credit will be given where appropriate, and there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated. No calculators or electronics of any kind are allowed. (Total of 45+5 points possible.)

1. (20 points) Find the inflection points and intervals of concavity for the following functions:

(a) \( f(x) = x^3 - 56x^2 + 3x - 10 \)

Answer:__________________________

(b) \( f(x) = (x + 1)^4 \)

Answer:__________________________

(c) \( f(x) = \sqrt[3]{x^2} + 3 \)

Answer:__________________________

(d) \( f(x) = x - \sin(x) \)

Answer:__________________________
2. (10 points) Campbell’s wants to redesign their 400 $cm^3$ soup cans in order to minimize the cost of the materials used (i.e. the external surface of the can). If we think of the can as a right cylinder, find the optimal base radius $r$ and height $h$ for the new can. 

[Hint: express everything in terms of the base radius].
3. (15 points) A retailer has determined that the cost $C$ of ordering and storing $x$ units of a product is given by

$$C = 2x + \frac{300000}{x}$$

(a) Find the optimal order size that would minimize the cost, if the truck delivering the orders can hold at most 300 units

Answer: 

(b) Find the optimal order size if the truck is replaced with one that can hold 400 units.

Answer:
4. (Bonus, 5 points) Let \( f(x) \) and \( g(x) \) be differentiable functions. Prove that if \( f(x) \) and \( g(x) \) are increasing, then \( h(x) = f(g(x)) \) is increasing as well.