Math 0120 Homework_06 is due : 08/29/2012 at 02:11pm EDT.

Reference: Berresford, Sections 3.2, 3.3, 3.4

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1. (1 pt) A fence is to be built to enclose a rectangular area of 300 square feet. The fence along three sides is to be made of material that costs 5 dollars per foot, and the material for the fourth side costs 15 dollars per foot. Find the length L and width W (with $W \leq L$) of the enclosure that is most economical to construct.

L = _____

W = _____

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2. (1 pt) Suppose that

$$f(x) = \frac{1}{8x^2+6}.$$

(A) Find the **smallest** inflection point of f.
Smallest inflection point: x = __________

(B) Find the **largest** inflection point of f.
Largest inflection point: x = __________

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3. (1 pt) The manager of a large apartment complex knows from experience that 110 units will be occupied if the rent is 474 dollars per month. A market survey suggests that, on the average, one additional unit will remain vacant for each 1 dollar increase in rent. Similarly, one additional unit will be occupied for each 1 dollar decrease in rent. What rent should the manager charge to maximize revenue? _______________

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4. (1 pt) The revenue from selling q items is $R(q) = 625q - q^2$, and the total cost is $C(q) = 150 + 8q$. Write a function that gives the total profit earned, and find the quantity which maximizes the profit.
Profit $\pi(q) =$ ________________________________
Quantity maximizing profit $q =$ _________________

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5. (1 pt) Consider the function $f(x) = -2x^3 + 33x^2 - 180x + 5$. This function has two critical numbers $A < B$
Find A _____
and B _____
For each of the following intervals, tell whether $f(x)$ is increasing (type in INC) or decreasing (type in DEC).
$(-\infty, A]$: _____
$[A, B]$: _____
$[B, \infty)$ _____ The critical number A is a relative __________ (type in MAX or MIN) and the critical number B is a relative __________ (type in MAX or MIN)

$f(x)$ has an inflection point at $x = C$
where C is _____
Finally for each of the following intervals, tell whether $f(x)$ is concave up (type in CU) or concave down (type in CD).
$(-\infty, C]$: _____
$[C, \infty)$ _____

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6. (1 pt) Let $f(x) = x^3 - (3/2)x^2$ on the interval $[-1, 2]$. Find the absolute maximum and absolute minimum of $f(x)$ on this interval.

The absolute max occurs at $x =$_______.
The absolute min occurs at $x =$_______.

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7. (1 pt) Let $f(x) = 3x^{2/3} - 2x$ on the interval $[-1, 1]$. Find the absolute maximum and absolute minimum of $f(x)$ on this interval.

The absolute max occurs at $x =$_______.
The absolute min occurs at $x =$_______.

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8. (1 pt) Let $g(x) = (4x)/(x^2+1)$ on the interval $[-4, 0]$. Find the absolute maximum and absolute minimum of $g(x)$ on this interval.

The absolute max occurs at $x =$_______.
The absolute min occurs at $x =$_______.

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9. (1 pt)
A rectangular storage container with a lid is to have a volume of 4 m^3. The length of its base is twice the width. Material for the base costs \$2 per m^2. Material for the sides and lid costs \$4 per m^2. Find the dimensions of the container which will minimize cost and the minimum cost.
base width = __________ m
base length = __________ m
height = __________ m
minimum cost = \$ ____________________

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10. (1 pt) A box is to be made out of a 6 by 14 piece of cardboard. Squares of equal size will be cut out of each corner, and then the ends and sides will be folded up to form a box with an open top. Find the length L, width W, and height H of the resulting box that maximizes the volume. (Assume that $W \leq L$).
L = _____

W = _____

H = _____

11. (1 pt) A company manufacturers and sells x electric drills per month. The monthly cost and price-demand equations are

$C(x) = 64000 + 60x,$

$p = 210 - \frac{x}{30}, \qquad 0 \leq x \leq 5000.$

(A) Find the production level that results in the maximum profit.
Production Level = _____

(B) Find the price that the company should charge for each drill in order to maximize profit.

Price = _____