Math 0120 Homework_13 is due : 08/26/2013 at 10:53pm EDT.

Reference: Berresford, Sections 7.3, 7.5

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1. (1 pt) Find the critical points for the function

$$f(x,y) = 2x^2 - 4xy + 3y^2 - 4y$$

and classify each as a local maximum, local minimum, saddle point, or none of these.

critical points: ______________________

(give your points as a comma separated list of (x,y) coordinates.)

classifications: ______________________

(give your answers in a comma separated list, specifying **maximum***,* **minimum***,* **saddle point***, or* **none** *for each, in the same order as you entered your critical points)*

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2. (1 pt) Find the critical points for the function

$$f(x,y) = x^3 + y^3 - 3x^2 - 27y + 7$$

and classify each as a local maximum, local minimum, saddle point, or none of these.

critical points: ______________________

(give your points as a comma separated list of (x,y) coordinates.)

classifications: ______________________

(give your answers in a comma separated list, specifying **maximum***,* **minimum***,* **saddle point***, or* **none** *for each, in the same order as you entered your critical points)*

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3. (1 pt) A manufacturer makes two products. The price functions for the two products are

$$p_1(x) = 22 - 3x, \quad p_2(y) = 23 - 2y.$$

The cost function is

$$C(x,y) = x + y - xy + 120.$$

Here x and y are daily production levels, and the price and cost functions are in thousands of dollars.

Find the production levels x and y which maximize the company's profit. Round your answers to the nearest integer.

$x =$ _____

$y =$ _____

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4. (1 pt) Use Lagrange multipliers to find the maximum and minimum values of $f(x,y) = 2x - 4y$ subject to the constraint $x^2 + 3y^2 = 84$, if such values exist.

maximum = ________________

minimum = ________________

(For either value, enter **DNE** *if there is no such value.)*

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5. (1 pt) A box with a square base and open top is to have a volume of 24000 cubic inches. The material for the base costs 3 cents per square inch, while the material for the sides costs 4 cents per square inch. Find the dimensions which minimize the cost of material.

Edge of base: _____ inches

Height: _____ inches

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6. (1 pt) A company has 6600 dollars to invest, which must be divided between capital expenditures and labor. Each unit of labor costs the company 40 dollars, and each unit of capital costs 40 dollars. Therefore

$$40L + 20K = 6600,$$

where L and K are the units of labor and capital, respectively. Production output is modeled by the Cobb-Douglas formula

$$P = L^{0.2}K^{0.8}.$$

Find the values of L and K which maximize production.

$L =$ _____

$K =$ _____