Math-71 Sections 9, 11, 12

Exam #3

Name: _____

This exam is closed book and notes. You may use a scientific calculator; however, no other electronics are allowed. You may also use the instructor-provided cheatsheet. Show all work; there is no credit for guessed answers. Simplify your answers unless told otherwise. In particular, all answers should contain no negative or rational exponents. All numerical answers should be in exact form unless you are specifically asked for a decimal value.

1. (20 points) Consider the follow function of two variables:

$$f(x,y) = \ln\left[\frac{5x^2y^3}{\sqrt{x^2+1}e^{(x^2+y^2)}}\right]$$

Determine the following partials:

a) f_x

b) f_y

c) f_{yy}

d) f_{xy}

2. (20 points) Use the second partial derivative test to find the the (x, y, z) coordinates *and* type of the absolute extremum on the following surface:

$$z = x^2 + 4x + y^2 - 2y + 10$$

3. (20 points) Use the Lagrange multiplier technique to find the (x, y, z) coordinates of the absolute extremum on the surface in problem 2 given the following constraint:

$$2x - y = 0$$

4. (10 points) Compare the answers in problems 2 and 3 and explain why they are either different or the same.

5. (10 points) Evaluate the following definite integral:

$$\int_{10}^{10} xe^{2x^3} dx$$

6. (20 points) Lululemon has announced that they want to make a push into the men's workout clothing market. To do so, they are going to need to raise some capital for design, manufacturing, and marketing. Lululemon has decided to issue corporate bonds to fund this launch. They hire your company, Bonds R Us, to underwrite the issuing of the new bonds. You estimate that as soon as the bonds are released for purchase ($t = 0$), the rate of change of the funds raised by the bond sales (in millions of dollars per hour) is expected to follow the following model:

$$\frac{dx}{dt} = 200e^{-2t}$$

How much money is raised in the first hour?