Student's Name ———————————————————————————
.   *(Please, print)*

GIVE REASONS FOR YOUR ANSWERS!

TEST 1:

HW:

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The Final Grade for TEST 1:

I. (10%) Suppose $z = f(x, y)$, $x = g(s, t)$, $y = h(s, t)$,

$$g(1, 2) = 3, \quad g_s(1, 2) = -1, \quad g_t(1, 2) = 4,$$

$$h(1, 2) = 6, \quad h_s(1, 2) = -5, \quad h_t(1, 2) = 10,$$

$$f_x(3, 6) = 7, \quad f_y(3, 6) = 8.$$

Find $\partial z / \partial s$ and $\partial z / \partial t$ when $s = 1$, $t = 2$.

II. (10%) Find the gradient of the function $f(x, y) = x^2 + y^3 - xy$ at the point $(2, 1)$.

III. (15%) Find the derivative of the function

$$f(x, y) = \frac{x}{x^2 + y^2}$$

at the point $(-1, 1)$ in the direction of the vector $< -\frac{3}{5}, \frac{4}{5} >$.

IV. (15%) Find the directions in which the function $f(x, y) = x^2 + \sin y$ increases and decreases most rapidly at the point $(1, 0)$. Then find the derivative of the function in these directions.

V. (15 %) Find all the local maxima, local minima and saddle points of the function

$$f(x, y) = x^3 + y^3 + 3x^2 - 3y^2 - 8.$$

VI. (10 %) Find the absolute maximum and minimum values of the function

$$f(x, y) = 2x + y + 1$$

in the region

$$D = \{(x, y)| \ x \geq 0, \ y \geq 0, \ x + y \leq 1\}.$$

VIII (15 %) Calculate the iterated integral:

$$\int_0^1 \int_0^1 e^{3x-y} dy dx.$$