MATH 1325 Final Exam   Name:

1.

(a) Find the total differential of $f(x,y) = (x + 5y + 9)e^{4x-y}$.

(b) Use this total differential and the value $f(0,0) = 9$ to estimate $f(0.1, 0.2)$.

2. Restricting x and y to be positive, the cost function $C(x, y) = 6x + 6y + 8x^{-1}y^{-1}$ has only one critical point. At this critical point, the cost is minimized. Find this critical point and find the minimum cost.

3. If you are travelling at speed $dx/dt = 50te^{-t/2}$, how far will you travel from over the time interval starting at $t = 0$ and ending at $t = 2$?

4. Suppose your income is $70,000 and currently increasing at a rate of $8,000 per year and your debt is $230,000 and currently decreasing at a rate $9,000 per year. What is the current rate of change of your debt-to-income ratio?

5. Find the average value of the function $f(x, y) = \frac{y}{x} + \frac{x}{y}$ on the rectangle $[1, 7] \times [1, 6]$