MTH 265, Quiz #5, Fall 2018 Name KEY

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Consider the function $f(x,y) = \ln(x+2y^2) - \cos xy$. Find f_x, f_y, f_{xy}.

$$f_x = \frac{1}{x+2y^2} \cdot 1 + y \sin xy = \frac{1}{x+2y^2} + y \sin xy$$

$$f_y = \frac{1}{x+2y^2} \cdot 4y + x \sin xy = \frac{4y}{x+2y^2} + x \sin xy$$

$$f_{xy} = (-1)(x+2y^2)^{-2} \cdot 4y + \sin xy + xy \cos xy$$

$$= \frac{-4y}{(x+2y^2)^2} + \sin xy + xy \cos xy$$

2. Calculate the total differential of $f(x,y,z) = xe^{yz}$, and then use the values of the function at (1,4,0) to estimate the value of the function at the point $(0.95, 4.1, 0.01)$.

$$dw = (e^{yz})dx + (xze^{yz})(dy) + (xye^{yz})(dz)$$

$$dw = (e^{4.0})(0.05) + (1 \cdot 0\, e^{4.0})(0.1) + (1)(4)(e^{4.0})(0.01)$$

$$= (1)(0.05) + 0 + 4(0.01)$$

$$= 0.09$$

$$f(1,4,0) = (1)e^{4.0} = 1$$

$$f(0.95, 4.1, 0.01) \approx 1 - 0.01 = 0.99$$