

Name: _____

Solutions

- Each quiz question is labeled with its worth toward your total quiz grade for the semester.
- On multiple choice problems, you do not need to show your work. No partial credit will be given.
- On full response problems, show all of your work and give a complete solution. When in doubt, don't skip any steps. Partial credit will be given at the discretion of the professor.
- This quiz is open notes and open book.
- This quiz is due at the end of class. Quizzes submitted over one minute late will be penalized by 50%.

1. (10 points) Compute the partial derivative matrix for

$$f(x, y) = (x + e^y, yx^2).$$

$$\begin{aligned} \underline{Df} &= \begin{bmatrix} \frac{\partial f_1}{\partial x} & \frac{\partial f_1}{\partial y} \\ \frac{\partial f_2}{\partial x} & \frac{\partial f_2}{\partial y} \end{bmatrix} \\ &= \begin{bmatrix} 1+0 & 0+e^y \\ y(2x) & (1)x^2 \end{bmatrix} = \begin{bmatrix} 1 & e^y \\ 2xy & x^2 \end{bmatrix} \end{aligned}$$

2. (10 points) The partial derivative matrix of the differentiable function

$$f(x, y, z) = (x, yz, x + 3z)$$

at the point $(1, 2, 1)$ is

$$Df(1, 2, 1) = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 2 & 3 \end{bmatrix}.$$

Explain why $f(1.1, 1.1, 0.9) \approx (1.1, 2.1, 3.9)$ using an appropriate linear approximation.

(Typo)