

# Quiz #3

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The following is Quiz #3. This quiz will be open until Thursday, October 22nd at 11:59 PM. Please complete this quiz on separate paper. Clearly indicate the question number for each question. Please show all work and clearly indicate your answers. Remember, this quiz is an opportunity for you to demonstrate what you know. You may treat this quiz as a take home quiz. This means that you may work with each other. However, please do not simply copy answers off each other. The point of this is to be able to help each other out if you need the assistance. You may seek out assistance from tutors. Please do not use other external sources for assistance, such as apps or other websites. You may use a calculator on this quiz. Once you complete this quiz, please submit a pdf of your quiz to Canvas. Scan in your quiz using the Adobe Scan app or any other scanning app.

Quiz #3:

(4 points) 1. Find  $\frac{dy}{dx}$  by using partial differentiation where  $y$  is defined implicitly as  $y = f(x)$  for the following equation:

$$\cos(x^2y^3) + x^2 + y^4 = x^3y^5$$

(4 points) 2. Find the derivative of the function  $f(x, y) = x^2y + y^2z$  at  $P_0(1, 2, 3)$  in the direction of  $\vec{u} = 2\hat{i} - \hat{j} + 2\hat{k}$ .

3. Given the following function:  $f(x, y) = \sin(xy)$

(2 points) a. Find the direction of most rapid increase at the point  $(1, 0)$ .

(2 points) b. Find the direction of most rapid decrease at the point  $(1, 0)$ .

(2 points) c. Find the directions of zero change at the point  $(1, 0)$ .

(4 points) 4. Find the equation of the tangent plane at the point  $P_0(3, 1, -1)$  on the surface  $x = y^2 + z^2 + 1$ .