

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

MATH201 - Section 02 (Term 161)

Date: December 01, 2016

Quiz 4

Duration: 30 minutes

Family Name: _____ ID #: _____ Serial #: _____

1. Let $z = f(x, y) = x^2y^2 - x$ where $x = e^{s-2t}$ and $y = s - t + t^2$

(a) Find $f_{xy}(3, 2) + f_{xx}(2, 1) \times f_{yy}(1, 0)$.

(b) Find $\frac{\partial z}{\partial s}$ at the point $(s, t) = (2, 1)$.

(5 + 4 = 9 points)

2. Find the **linearization** of the function $f(x, y) = (1 + x^2)^y$ at the point $(x, y) = (-1, 1)$ and use your result to estimate $f(-0.97, 1.12)$. **(5 points)**

3. Find the directional derivative of the function $f(x, y, z) = \tan^{-1}(xyz)$ at the point $P(1, 2, 1)$ in the direction from P to $Q(5, 13, 7)$. What is the maximum rate of change of f at P and in what direction? **(6 points)**

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

DEPARTMENT OF MATHEMATICS & STATISTICS

MATH201 - Section 07 (Term 161)

Date: December 01, 2016

Quiz 4

Duration: 30 minutes

Family Name: _____ ID #: _____ Serial #: _____

1. Let $z = f(x, y) = y^2 \tan^{-1}(xy)$

(a) Find $f_x(0, 2) + f_y(0, 2) - f_{xy}(0, 2)$.

(b) Find an equation of the tangent plane to the surface f at the point $P(0, 2, 0)$.

(5 + 4 = 9 points)

2. Find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ at the point $P(2, 1, 1)$ if the equation $yz + x \ln y = z^2$ defines z implicitly as a function of x and y . **(5 points)**

3. Find the directional derivative of the function $f(x, y, z) = \sqrt{y + xz}$ at the point $P(3, 1, 1)$ in the direction from P to $Q(6, 3, 7)$. What is the maximum rate of change of f at P and in what direction? **(6 points)**