

King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Math 201-11&14 Exam2 Fall 2006(061)

ID#: _____ NAME: _____

Serial# _____ Sec: _____

(1) (a) Show that the lines L_1 and L_2 with parametric equations (10pts)

$$L_1: x = 1 + 2t, y = 3t, z = 2 - t$$
$$L_2: x = -1 + s, y = 4 + s, z = 1 + 3s$$

are skew lines.

(b) Find the distance between L_1 and L_2 . (10pts)

(2) Identify and sketch the surface $\rho = 2 \cot \phi \csc \phi$.
(Hint: Express the equation in rectangular coordinate)

(10pts)

(3) Find the limit, if it exists, or show that the limit does not exist.

(i) $\lim_{(x,y) \rightarrow (0,0)} \frac{\tan(x^2+y^2)}{x^2+y^2}$.

(ii) $\lim_{(x,y,z) \rightarrow (0,0,0)} \frac{xy+yz+zx}{x^2+y^2+z^2}$.

(10pts)

(4) Find the linear approximation of the function $f(x, y) = x^\alpha y^\beta$ at $(1, 1)$. (10pts)

(5) Using implicit differentiation, find $\frac{\partial z}{\partial x}$ and $\frac{\partial z}{\partial y}$ for $xyz = \cos(x+y+z)$. (10pts)

(6) Find the directional derivative $D_u f(1,2)$ if $f(x,y) = x^3 - 3xy + 4y^2$ and u is the unit vector given by the angle $\theta = \frac{\pi}{6}$. (10pts)

(7) Find the equations of the tangent plane and normal line at the point $(4, -1, 1)$ to the Ellipsoid $x^2 + 2y^2 + 3z^2 = 21$. (10pts)

(8) Locate all relative maxima, relative minima, and saddle points for
 $f(x, y) = x^3 + y^2 - 12x + 6y - 7$.

(10pts)

Dr. M. R. Alfuraidan