KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
MATH 201-06
Exam # 2
April 30, 2008

NAME:	ID#:

SHOW ALL YOUR WORK

1. (a) **(4 points)** Find the equation of the tangent plane and the parametric equations of the normal line to the surface $xy + \ln(y/z) = 8$ at the point $(4, 2, 2)$.

   (b) **(4 points)** Calculate $\frac{\partial x}{\partial w}$ and $\frac{\partial z}{\partial w}$ for $xe^w + we^z = ze^x$.

2. (a) **(4 points)** A right circular cone had radius 120 in. and hight 140 in. if the error in measuring the radius is 1.8 in and the error in measuring the hight is -2.5 in. use differentials to estimate the error in calculating the volume of the cone. (The volume of a right circular cone is $V = \frac{\pi}{3}r^2h$.)

   (b) **(3 points)** Find all points on the line $x = 1 + t, y = 2 - 3t, z = 4 + 2t$ that are at the same distance from the two planes $x - 2y + 3z = 1,\ 2x + 3y + z = 2$.

3. (a) **(3 points)** Find the minimum rate of change of the function $f(x, y, z) = xy \sin(xz)$ at the point $\left(1, -1, \frac{\pi}{3}\right)$ and the direction in which it occures.

   (b) **(4 points)** Find all directions $\mathbf{u}$ in which the function $f(x, y) = x^2 + 2y$ has slope 1 at the point $(1, 0)$.

4. (a) **(4 points)** Find the equation of the plane that passes through the three points $(1,0,0)\,,(0,2,-2)\,,(-5,2,1)\,.$

   (b) **(4 points)** Identify and sketch the surface $z = x^2 + 2y^2 + 1$.