KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS
MATH 201-11
Exam # 2
Nov 28, 2007

NAME:	ID#:

SHOW ALL YOUR WORK

1. (a) **(4 points)** Is the function

$$f(x,y) = \begin{cases} \frac{xy}{x^2+xy+y^2} & (x,y) \neq (0,0) \\ \frac{1}{3} & (x,y) = (0,0) \end{cases}$$

continuous at $(0,0)$? Why?

(b) **(4 points)** Calculate $\lim_{(x,y)\to(0,0)} \frac{x^3+y^3}{x^2+y^2}$.

2. (a) **(4 points)** Find and sketch the domain of the function $f(x,y) = \sqrt{x^2+y^2-1} + \ln(4-x^2-y^2)$.

   (b) **(3 points)** Find $h(x,y) = g(f(x,y))$ where $g(t) = t^2 + \sqrt{t}$ and $f(x,y) = 2x - 3y - 6$.

3. (a) **(3 points)** Describe and sketch the graph of the surface $r = 2\cos\theta$.

   (b) **(4 points)** Write the equation $z = x^2 - y^2$ (a) in cylindrical coordinates and (b) in spherical coordinates.

4. (a) **(4 points)** Find the equation of the plane that passes through the line of intersection of the two planes $x - z = 1$ and $y + 2z = 3$ and is perpincicular to the plane $x + y - 2z = 1$.

   (b) **(4 points)** Determine whether the function $u = \ln \sqrt{x^2 + y^2}$ is a solution of the equation $u_{xx} + u_{yy} = 0$.