Selda Küçükçifçi May 9, 2005
Math 200: Multivariable Calculus and Matrix Algebra
EXAM II

NAME: _____

1	/24
2	/18
3	/22
4	/16
5	/20
Total:	/100

WRITE ALL ANSWERS CLEARLY, AND SHOW ALL WORK TO GET CREDIT
NO QUESTIONS, NO CALCULATOR, 90 MINUTES

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1. a) (6 points) Find the point in which the line through the origin perpendicular to the plane $2x - y - z = 4$ meets the plane $3x - 5y + 2z = 6$.

b) (6 points) How can you tell when two planes $A_1x+B_1y+C_1z=D$ and $A_2x+B_2y+C_2z=D_2$ are parallel? Perpendicular? Give reasons for your answers.

c) (6 points) Is the line $x=1+3t, y=2-t, z=2+3t$ parallel to the plane $x-z=5$? Give reasons for your answer.

d) (6 points) Describe the set of points in space that lie 2 units from the point $(0,0,1)$ and at the same time 2 units from the point $(0,0,-1)$.

2. a) (6 points) Replace the polar equation $r = \sin\theta$ by a cartesian equation and sketch its graph.

b) (6 points) Graph $r = 1 - \sin\theta$.

c) (6 points) Find the points of intersection of $r = \sin\theta$ and $r = 1 - \sin\theta$. Give the coordinates of the points of intersection both in cartesian and polar forms.

3. a) (8 points) Find the domain and the range of the function $f(x, y) = \frac{1}{\sqrt{x^2 - y^2}}$. Decide if the domain is bounded or unbounded. Explain your answer.

b) (8 points) Describe the level curves of this function.

c) (6 points) Find $f_x(x, y)$ and $f_{xy}(x, y)$.

4. (8 points) a) What condition must the constants a, b, and c satisfy to guarantee that the $\lim_{(x,y)\to(0,0)} \dfrac{xy}{ax^2+bxy+cy^2}$ exists? Explain your answer.

b) (8 points) Suppose the equation $x^2y + e^{x+2y} + \cos(xy^3) - 6 = 0$ defines y as a differentiable function of x. Find the value dy/dx at the point $P(\ln 5, 0)$.

5. a) (7 points) Find the tangent plane to the surface with equation $z = x^4 - 4xy^3 + 6y^2 - 2$ at the point $P(0, 1, 4)$.

b) (7 points) Find the coordinates of all points on the surface in part (a) where the surface has a horizontal tangent plane.

c) (6 points) Find parametric equation for the line tangent to the intersection of the surface in part (a) and the plane with equation $x + y - 1 = 0$ at the intersection point $P(0, 1, 4)$.