

KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS
MATHEMATICAL SCIENCES DEPARTMENT

MATH 201

EXAM # 2

Tuesday October 23, 2001

NAME:

Sec#:

ID#:

SHOW ALL YOUR WORK

1. (2pts each) Sketch the following surfaces

(a) $z = \sqrt{1 - x^2 - y^2}$

(b) $z = \sqrt{x^2 + y^2}$

(c) $z = \sqrt{1 + x^2 + y^2}$

(d) $z = \sqrt{x^2 + y^2 - 1}$

2. a. (4pts) Find the point of intersection of the plane $2x + y - z = 0$ and the line
 $x = 1 + 2t, \quad y = 2 - 5t, \quad z = 3 - 4t$
- b. (4pts) Locate the point of intersection of the plane $2x + y - z = 0$ and the line through $(3, 1, 0)$ that is perpendicular to the plane.

3. a. (4pts) Show that the lines

$$L_1 : \quad x + 1 = 4t, \quad y - 3 = t, \quad z - 1 = 0;$$

$$L_2 : \quad x + 13 = 12t, \quad y - 1 = 6t, \quad z - 2 = 3t$$

intersect and find their point of intersection.

b. (4pts) Find the equation of the plane that is determined by the two lines in part (a).

4. a. (3pts) Find the distance between the point $P(-3, 1, 2)$ and the line through the points $A(1, 1, 0)$, $B(3, -2, 7)$.
- b. (4pts) Use vectors to show that the diagonals of a square are equal and perpendicular to each other.

5. **a. (3pts)** Find the equation of the surface $\rho = 6 \cos \varphi$ in rectangular coordinates and sketch the graph.
- b. (2pts)** Find the equation of the surface $r = 6 \cos \theta$ in rectangular coordinates and sketch the graph.
- c. (4pts)** Find a polar and a spherical equation (in simplest form) for the surface $z = \sqrt{1 - x^2 - y^2}$.