MAC 2313 Calculus 3 **Test 1** 19 Sep 2000

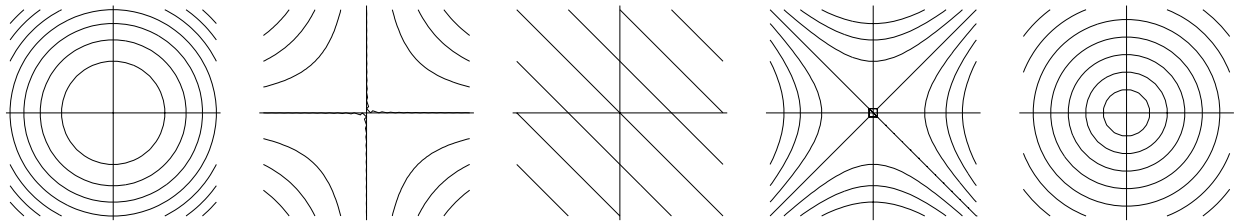
Show **ALL** work for credit; be neat; and use only **ONE** side of each page of paper. Do **NOT** write on this page. Calculators can be used for graphing and calculating only. Give exact answers when possible.

1. Find the equation of the plane perpendicular to the vector $\mathbf{n} = \langle 5, 1, -2 \rangle$ and passing through the point $(0, 1, -1)$.

2. Find the equation of the plane through the points (1,3,0), (3,4,-3) and (3,6,2).

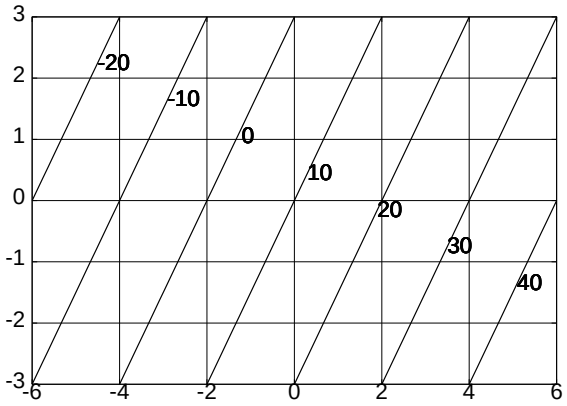
3. The following are maple contour plots of $z = xy, z = x^2 + y^2, z^2 = x^2 + y^2, z = x + y$, and $z = x^2 - y^2$ over the range $x = -3..3$ and $y = -3..3$. Match the plot to the function.

A B C D E



4. Find the equation of the linear function $f(x, y) = ax + by + c$ that
(a) has the partial given table of values (below left).
(b) has the given contour graph (below right).

| | y=3 | y=5 | y = 7 |
|---|---|---|---|
| $x = 1$ | 2 | ? | ? |
| $x = 4$ | ? | 0 | 4 |




5. Give an equation which fits the description.
(There are multiple correct answers.)
(a) Hyperboloid of one sheet.
(b) Hyperboloid of two sheets.
(c) Hyperbolic paraboloid.
(d) Elliptical paraboloid.
(e) Sphere with center (1,2,3) and radius 4.

6. Find the value(s) (if any) of x which would make the vectors $\langle 2, x, 3 \rangle$ and $\langle x, 8, 6 \rangle$ are perpendicular, and find the value(s) (if any) which would make vectors are parallel.

7. Find the coordinates of the point where the line through the points $(2, -1, 3)$ and $(4, -2, 1)$ intersects the plane $x + 2y - z = 13$

8. Consider the plane $P$ given by the equation $2x + 4y - z = -8$.
(a) Find a point on the $x$-axis on the plane $P$.
(b) Find a vector going from the point $Q = (3, -2, 4)$ to the point you found in (a).
(c) Find the scalar projection of the vector in (b) in the direction normal to $P$.
(d) Find the distance from $Q$ to $P$.

9. Find the 8 errors in the following Maple command. Assume that a restart command has just been given or equivalently that this is the very first line typed into Maple. (No "with(plots);" is not one of them.)

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▷ a:0;b=5;plot3d(x y + 3x^2,x=a..b,y:=3..-3,NUMPOINTS=99,title="oops...I did it again");
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There is more test on the otherside

10. Odds and ends: In parts (a-d): Give an equation which fits the description. (There are multiple correct answers.) Sketch the graph in part (e).

(a) The xz-plane.

(b) Ellipsoid with the y-axis direction twice the size of the other two.

(c) Circular Cylinder whose axis is the z-axis.

(d) Two planes parallel to the xy-plane. (One equation whose solution is exactly the two planes.)

(e) Sketch the temperature cross-section along the thick horizonal line in the contour graph below. (No equation, just the graph.)