

Math 2313, Test I

Name _____

1. Describe, in words, the level curves/surfaces of (also state if the level curves/surfaces are equally spaced or not):

a. $f(x, y) = e^{-x^2-y^2}$

answer: circles with center at origin, not uniformly spaced

b. $f(x, y) = x + y + 2$

answer: lines with slope $m = -1$, uniformly spaced

c. $f(x, y, z) = x^2 + z^2$

answer: cylinders with axis = y axis, not uniformly spaced

d. $f(x, y, z) = x + y + z$

answer: planes parallel to $z = -x - y$, uniformly spaced

2. Find an equation for the largest sphere contained in the cube with corners $(2, 5, -1)$, $(2, 5, 3)$, $(2, 9, -1)$, $(2, 9, 3)$, $(6, 5, -1)$, $(6, 5, 3)$, $(6, 9, -1)$, $(6, 9, 3)$.

answer: $(x - 4)^2 + (y - 7)^2 + (z - 1)^2 = 4$

3. Find the equation of the plane:
- parallel to the plane $2x + 4y - 3z = 1$ and through the point $(2, 0, 3)$
answer: $2x + 4y - 3z = -5$
 - through the points $(3, 4, 2)$, $(-2, 1, 0)$, $(0, 2, 1)$.
answer: $-x + y + z = 3$
4. Consider the two planes $4x - 3y + 2z = 12$ and $x + 5y - z = 25$.
- Find a vector parallel to the line of intersection of these planes.
answer: $(-7, 6, 23)$
 - Find the angle between the two planes (at the intersection)
answer: $\theta = 117.68$ degrees
5. Find the area of a triangle which has edges $u = (1, 3, 1)$ and $v = (3, 5, 2)$ and $u - v$.

answer: $\frac{\sqrt{18}}{2}$