REVIEW FOR EXAM 1

REMEMMBER : YOU ' LL HAVE TO SHOW ALL WORK

1. Find the distances of the point $(2, 3, -1)$ to

(**a**) the xy – plane

(**b**) the point $(1, 4, -3)$

2. Give an equation of the sphere of radius 2 centered at the point $(1, -2, 3)$.

3. Depict the plane whose equation is $y = 2$.

4. Depict the surfaces whose equations are

(**a**) $z = y^2$

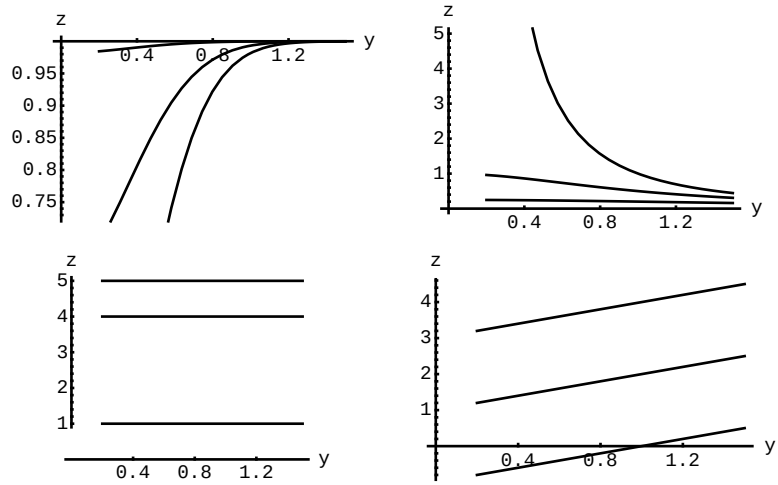
(**b**) $z = 3 - x - 2y$

5. Match the functions

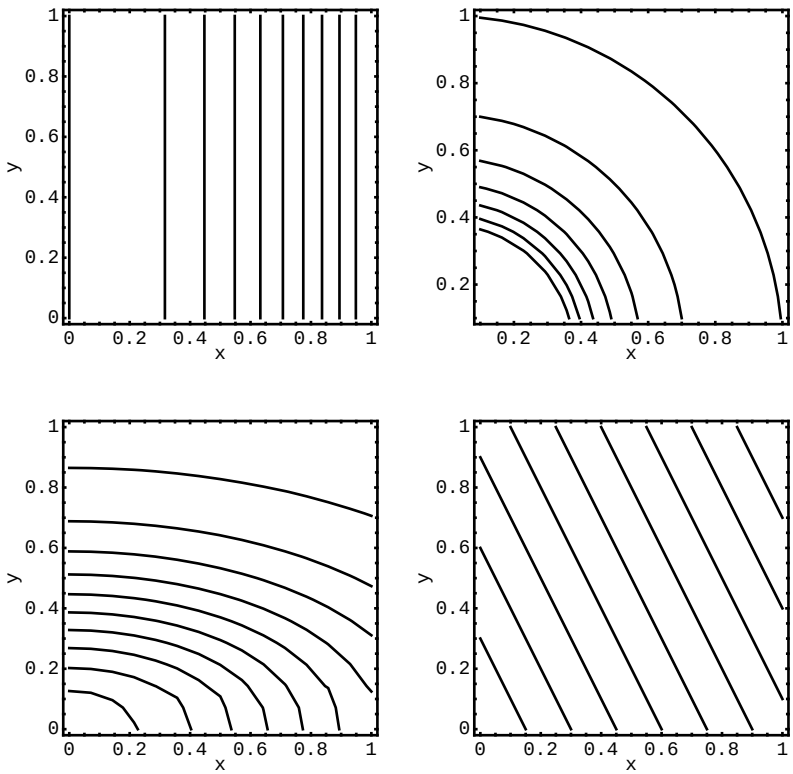
(i) $z = 2x + y - 1$; (ii) $z = \dfrac{1}{x^2 + y^2}$; (iii) $z = 1 - e^{-(x^2 + 4y^2)}$; (iv) $z = 5 - x^2$

with

(**a**) the cross – sections at $x = 0, 1, 2$:

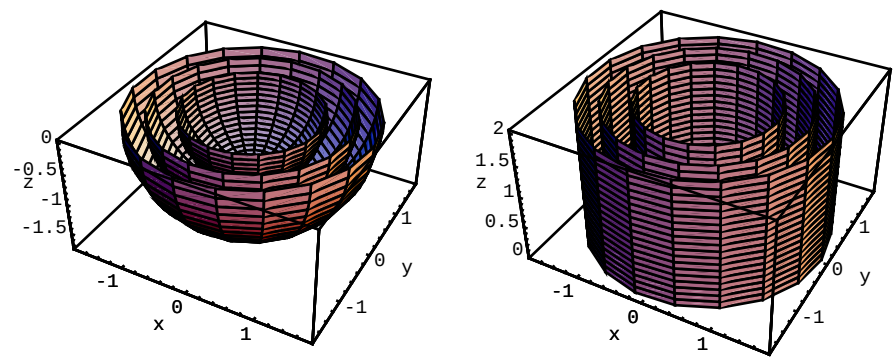


(**b**) the contour plots :



6. What is the linear function of x and y with value $z = 2$ when $x = 1$ and $y = -1$, slope 3 in the x direction and slope (-0.5) in the y direction?

7. Match the functions $f(x, y, z) = x^2 + y^2$ and $g(x, y, z) = x^2 + y^2 + z^2$ with the following families of level surfaces :



8. Given the function $f(x, y) = 3x^2 - y^3$ and the point $(1, 2)$,

(**a**) use difference quotients with $\Delta x = 0.1$ and $\Delta y = 0.1$ to estimate the partial derivatives $f_x(1, 2)$ and $f_y(1, 2)$

(**b**) find the same partial derivatives exactly

9. Given the function $f(x, y) = xe^{-2y}$ and the point $(1, 0)$,

(**a**) find the differential at this point

(**b**) write down the equation of the tangent plane to the graph of the function at the given point

(**c**) compute the linear approximation to the value of the function at point $(1.01, -0.02)$

10. Given the function $f(x, y) = \ln\left(\frac{1}{x} - \sin y\right)$ and the point $(1, 0)$,

(**a**) find the gradient at this point

(**b**) the directional derivative at this point in the direction of the vector $\vec{v} = 2\vec{i} + 3\vec{j}$