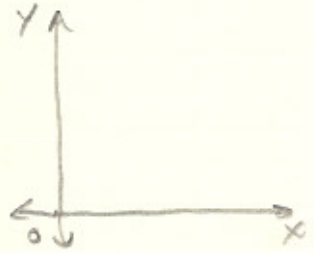
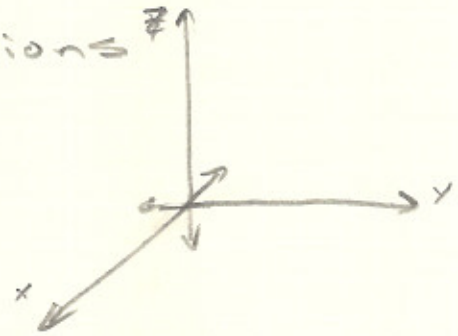
§ 13.1 THREE DIMENSIONAL SYSTEM.

2 dimensions



x coordinate
y coordinate

3 dimensions

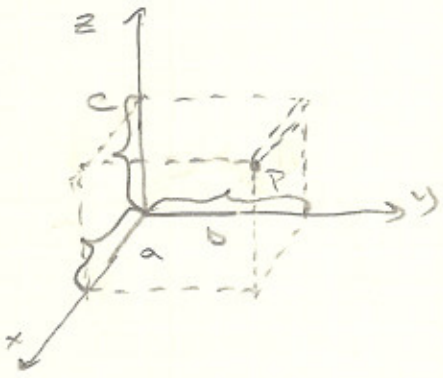


note: We will always draw this system like this way (right hand rule)

now we consider the planes; xy plane
yz plane
xz plane

a point in this system

$P(a, b, c)$ — c: z axis, b: y axis, a: x-axis

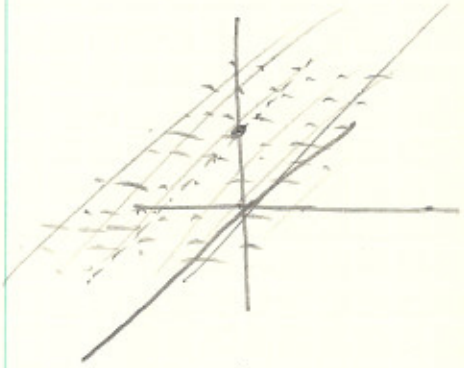


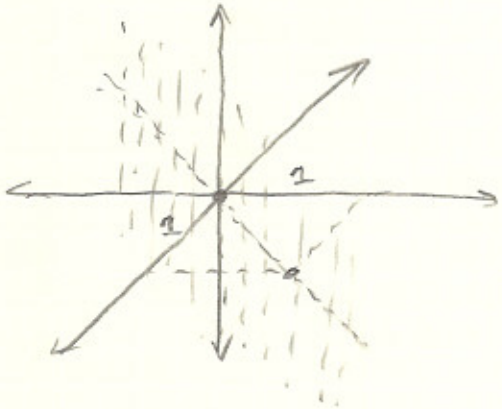
§13.6 CYLINDERS AND QUADRATIC SURFACES.

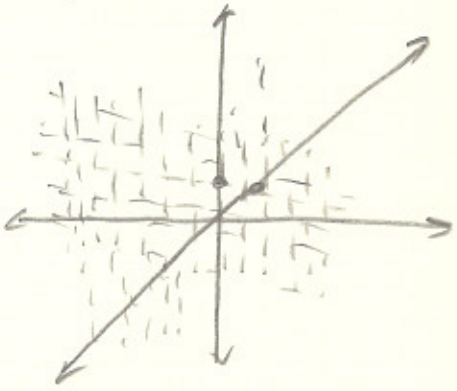
note: ($\mathbb{R}^3$) means real numbers, 3 coordinates.

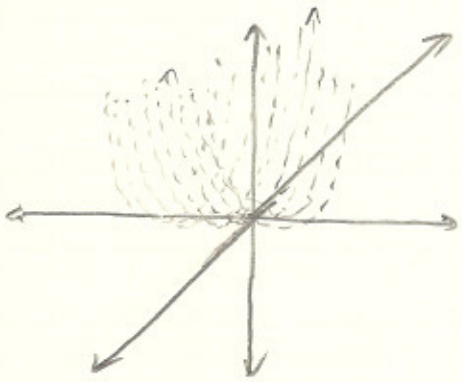
EX. What surfaces in $\mathbb{R}^3$ are described by

(a) $z = 5$
(b) $x = y$
(c) $z = 2x + 1$
(d) $z = x^2$
(e) $x^2 + y^2 = 9$
(f) $x^2 + y^2 + z^2 = 4$.

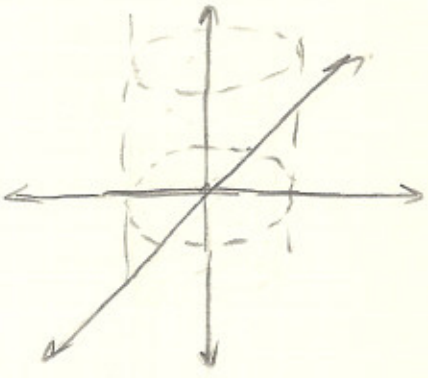








ditch shaped.



cylinder in infinite $\pm z$

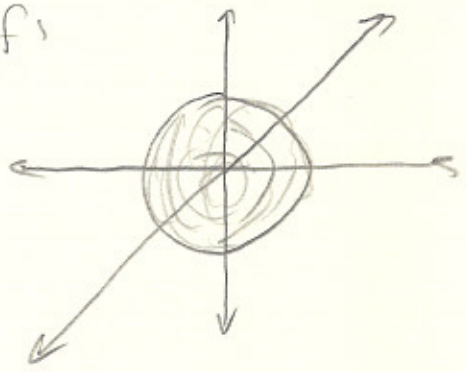
note: distance in a 3 dimesional plane.

$P_1(x_1, y_1, z_1)$

$P_2(x_2, y_2, z_2)$

$$|P_1 P_2| = \sqrt{(x_1 - x_2)^2 + (z_1 - z_2)^2 + (y_1 + y_2)^2}$$

(f)



sphere.

Ex. what is the surface in $\mathbb{R}^3$ is represented by intersection of the following 2 surfaces

$x = y^2 - 1$ and $x = 5$