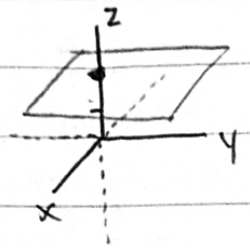
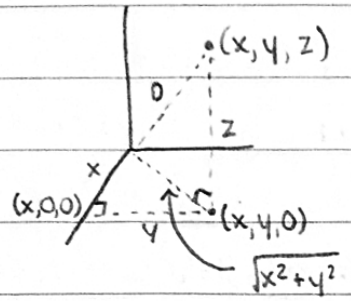
3D Cartesian Coordinates

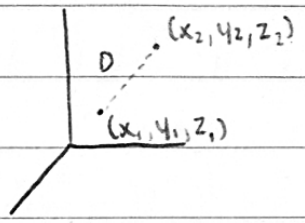
MA 113



$z = 2$ plane above and parallel to the x-y plane



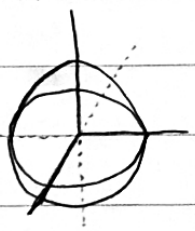
$$D = \sqrt{z^2+x^2+y^2}$$
$$= \sqrt{x^2+y^2+z^2}$$



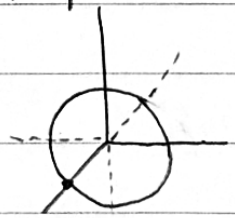
$$D = \sqrt{(x_2-x_1)^2+(y_2-y_1)^2+(z_2-z_1)^2}$$

A sphere has a radius $r = 5$ and is centered at the origin. Find an equation for the surface of the sphere.

$$x^2+y^2+z^2 = 25$$



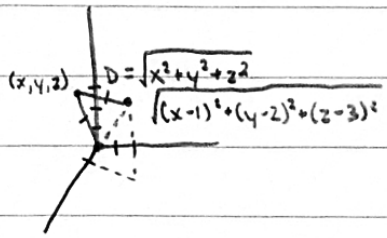
$$x^2+y^2-z^2 = 25$$



$$z = \pm\sqrt{25-x^2-y^2}$$

x	y	z
0	0	∅
5	0	0
10	10	$\pm\sqrt{175}$

Find an equation describing all points which are the same distance from (0,0,0) and (1,2,3)

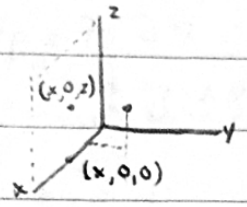


$$x^2+y^2+z^2 = (x-1)^2+(y-2)^2+(z-3)^2 = x^2-2x+1+y^2-4y+4+z^2-6z+9$$

$$2x+4y+6z = 14 \Rightarrow \boxed{x+2y+6z = 7}$$

Find the distance from (1,1,1) to the

a. x-axis b. x-z plane



a. $\sqrt{(1-x)^2+1^2+1^2} = \sqrt{(1-x)^2+2}$

minimum distance when $x=1$, $\boxed{D=\sqrt{2}}$

b. $\sqrt{(1-x)^2+1^2+(1-z)^2}$

minimum distance when $x=1$, $z=1$, $\boxed{D=1}$