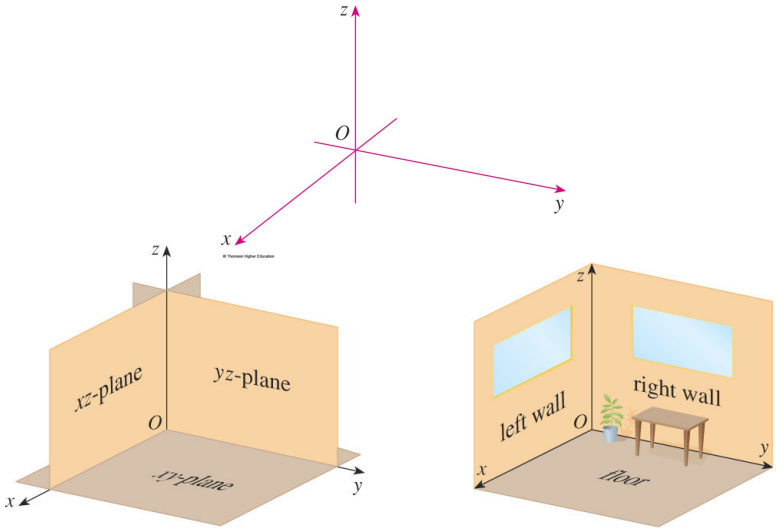
12.1 Three Dimensional Coordinate Systems (Cartesian)



(a) Coordinate planes (b)

Points have coordinates:

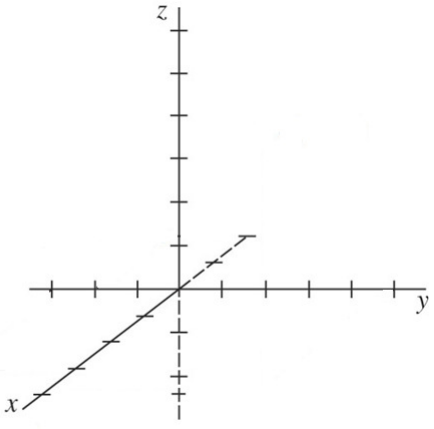
(x, y, z)

Example:

$A: (4, 5, 6)$

$B: (3, -3, -1)$

$C: (-2, -2, 0)$



Distance between points: $P_1 : (x_1, y_1, z_1)$

$P_2 : (x_2, y_2, z_2)$

$d = |P_1P_2|$

$A : (4, 5, 6)$
$B : (3, -3, -1)$
$C : (-2, -2, 0)$

Find $|AB|$ and $|AC|$. Which is larger?

$|AB| =$

$|AC| =$

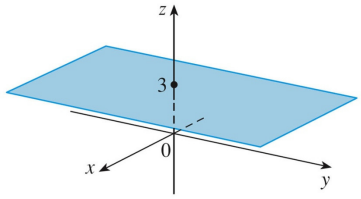
Equation of a **sphere**:

Center: Radius:

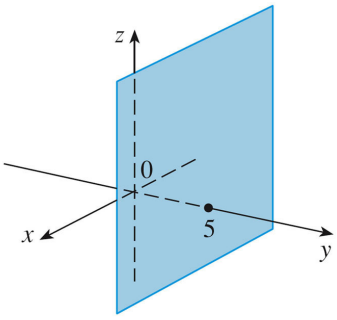
Find the equation of the sphere with center at $(0, -3, 6)$ and radius $\sqrt{3}$.

Find the center and radius of the sphere that has the given equation:
$4x^2 + 4y^2 + 4z^2 - 4x + 8y - 3 = 0$

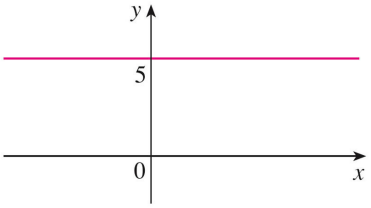
Center: Radius:



(a) $z = 3$, a plane in $\mathbb{R}^3$



(b) $y = 5$, a plane in $\mathbb{R}^3$

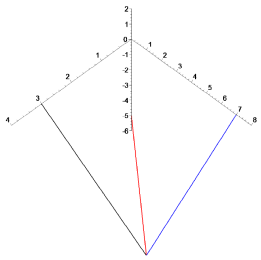


(c) $y = 5$, a line in $\mathbb{R}^2$

Math 114 – Rimmer
12.1 3-D Cartesian Coord.

10. Find the distance from $(3, 7, -5)$ to each of the following.

(a) The xy-plane
(b) The yz-plane
(c) The xz-plane
(d) The x-axis
(e) The y-axis
(f) The z-axis



22. Find an equation of the largest sphere with center (5, 4, 9) that is contained in the first octant.

39. Find an equation of the set of all points equidistant from the points $A(-1, 5, 3)$ and $B(6, 2, -2)$. Describe the set.

Math 114 – Rimmer
12.1 3-D Cartesian Coord.

Let $P(x, y, z)$ be a generic point that is equidistant from the given points