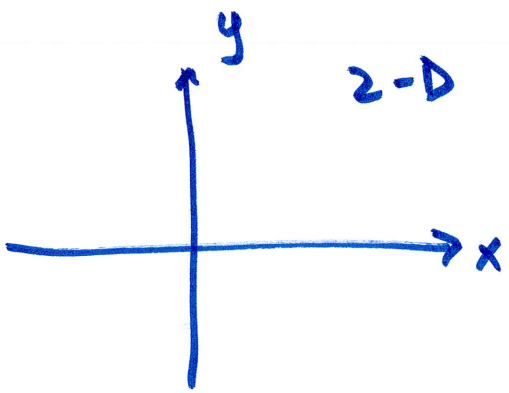
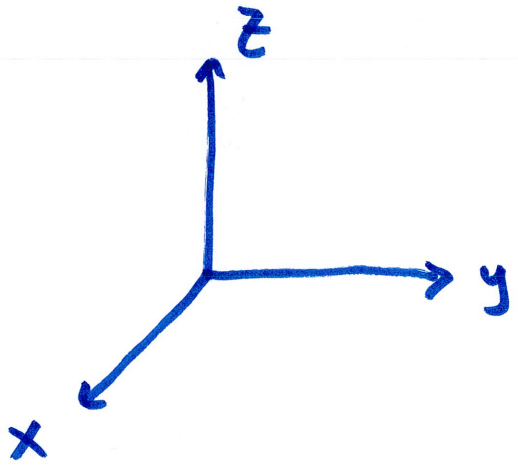
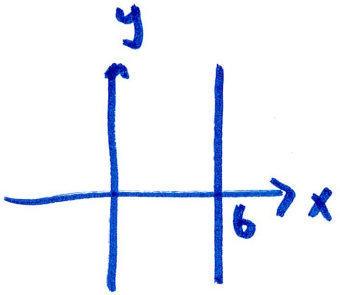
12.1 3-D Coordinate Systems





most of what you about 2-D is still good for 3-D

$x=6$ in 2D

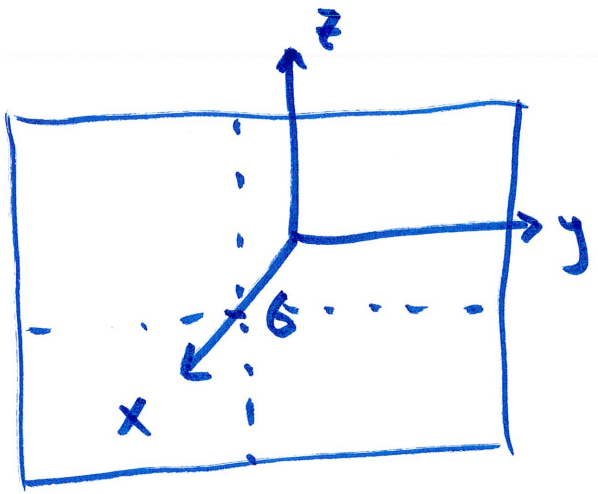


$x=6$, y = everything

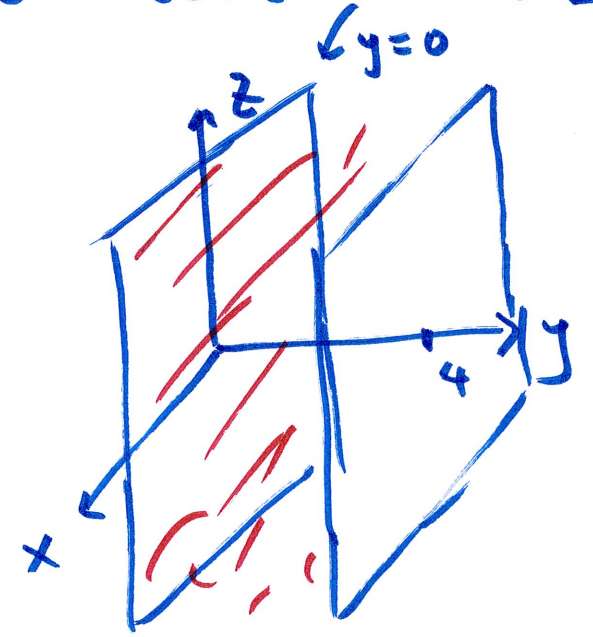
$x=6$ in 3D

$x=6$, y = everything, z = everything

$x = 6$ in 3D is a plane parallel to yz-plane thru $x = 6$



what about $0 \leq y \leq 4$ $\Rightarrow$ everything between planes $y = 0$ and $y = 4$



Distance $P(x_1, y_1, z_1)$ $Q(x_2, y_2, z_2)$

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

example Triangle with vertices

$P(3, -3, -2)$ $Q(9, 0, 4)$ $R(12, -6, -2)$

Is this a right-angle triangle?

any right-angle triangle satisfies the Pythagorean Theorem.

$$|PR| = \sqrt{(12-3)^2 + (-6+3)^2 + (-2+2)^2} = \sqrt{90}$$

$$|PQ| = \sqrt{6^2 + 3^2 + 6^2} = \sqrt{81} = 9$$

$|QR| = 9$

$(\sqrt{90})^2 \neq 9^2 + 9^2$

so NOT right-angle Δ

Sphere

center (h, k, l) radius r

standard equation $(x-h)^2 + (y-k)^2 + (z-l)^2 = r^2$

12.2 Vectors

a quantity with magnitude (length) and direction. e.g. wind 20 mph SW

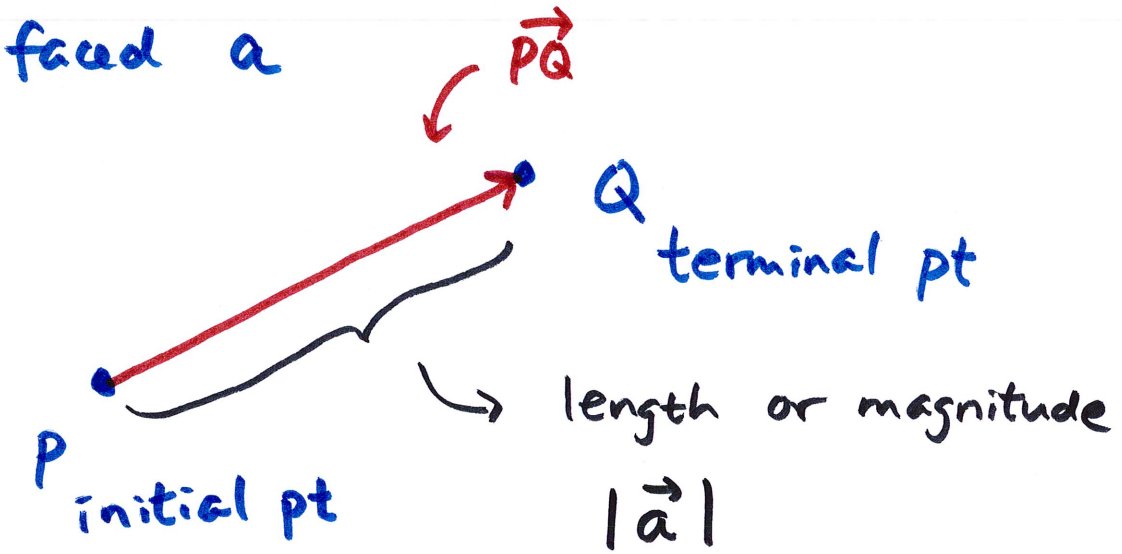
a quantity with magnitude only is called a **scalar** e.g. points Purdue b-ball scored last night

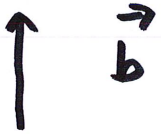
graphically represented by arrow

$\vec{a}$ or bold faced a

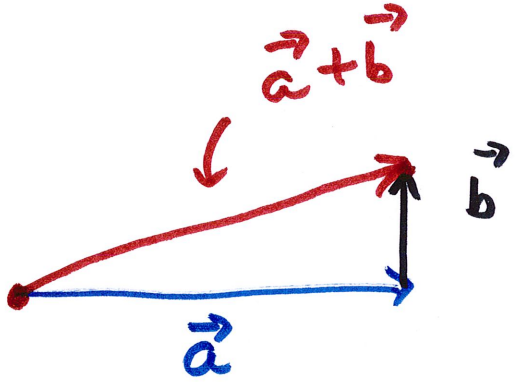
$\vec{PQ}$

from P to Q



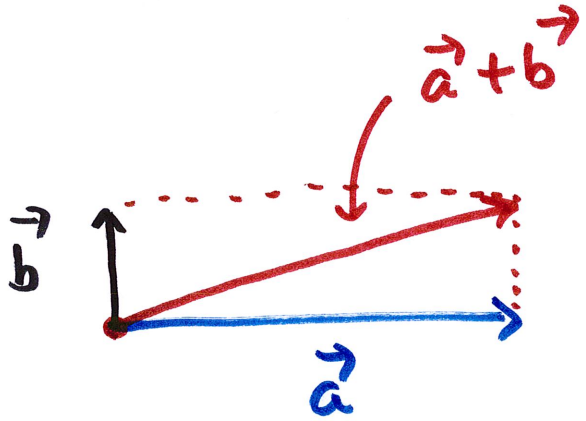


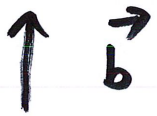
$\vec{a} + \vec{b}$



put initial pt of $\vec{b}$ on terminal pt of $\vec{a}$

or





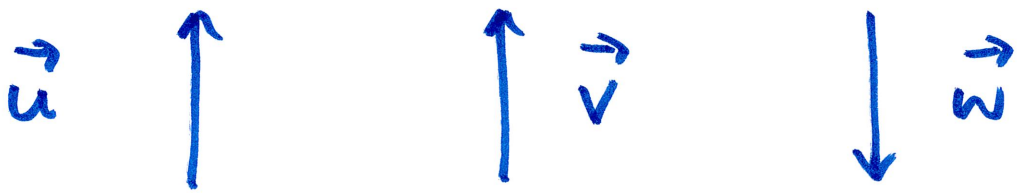
$2\vec{a}$

$2\vec{a}$ double length

$-2\vec{a}$

double length reverse direction

any two vectors w/ same magnitude and direction are equal (location doesn't matter)



$\vec{u} = \vec{v}$