Notes: 9.3, 9.4 3-D Vectors

If given points : (x_1, y_1, z_1) *and* (x_2, y_2, z_2) then

Vector Component Form:

$$v = \langle x_2 - x_1, \; y_2 - y_1, \; z_2 - z_1 \rangle$$

The sum of unit vectors in 3 dimensions:

$$\langle 8, -13, 2 \rangle = 8i - 13j + 2k$$

Magnitude (same as length or distance)

$$|u| = \sqrt{(a_1)^2 + (a_2)^2 + (a_3)^2} \quad \text{if } \mathbf{u} = \langle a_1, a_2, a_3 \rangle$$

Dot Product:

If $\vec{\mathbf{u}} = \langle a_1, a_2, a_3 \rangle$ and $\vec{\mathbf{v}} = \langle b_1, b_2, b_3 \rangle$

then $\mathbf{u} \bullet \mathbf{v} = a_1 b_1 + a_2 b_2 + a_3 b_3$ ←multiply like components

If u.v = 0, then vector u and v are perpendicular.

Notes: 9.3, 9.4 **3-D** Vectors

9.3 #3-6 do not graph!!

9.4 #3-35odd

write given problem and show work!

3–6 ■ ~~Plotting Points~~ and Finding Distance in Three Dimensions

Two points P and Q are given. ~~(a) Plot P and Q.~~ **(b)** Find the distance between P and Q.

$x_1\ y_1\ z_1 \qquad x_2\ y_2\ z_2$

3. $P(3, 1, 0), \quad Q(-1, 2, -5)$

4. $P(5, 0, 10), \quad Q(3, -6, 7)$

5. $P(-2, -1, 0), \quad Q(-12, 3, 0)$

6. $P(5, -4, -6), \quad Q(8, -7, 4)$

(a) Find vector v in component form

(b) Find the distance (magnitude)

3. $\vec{PQ} = \langle -1-3, 2-1, -5-0 \rangle$

$\vec{a}$

$= \boxed{\langle -4, 1, -5 \rangle}$

b. $|\vec{PQ}| = \sqrt{(-4)^2 + (1)^2 + (-5)^2}$

$= \sqrt{16+1+25}$

$= \sqrt{42}$

9.3 #3-6 do not graph!

(a) Find vector v in component form

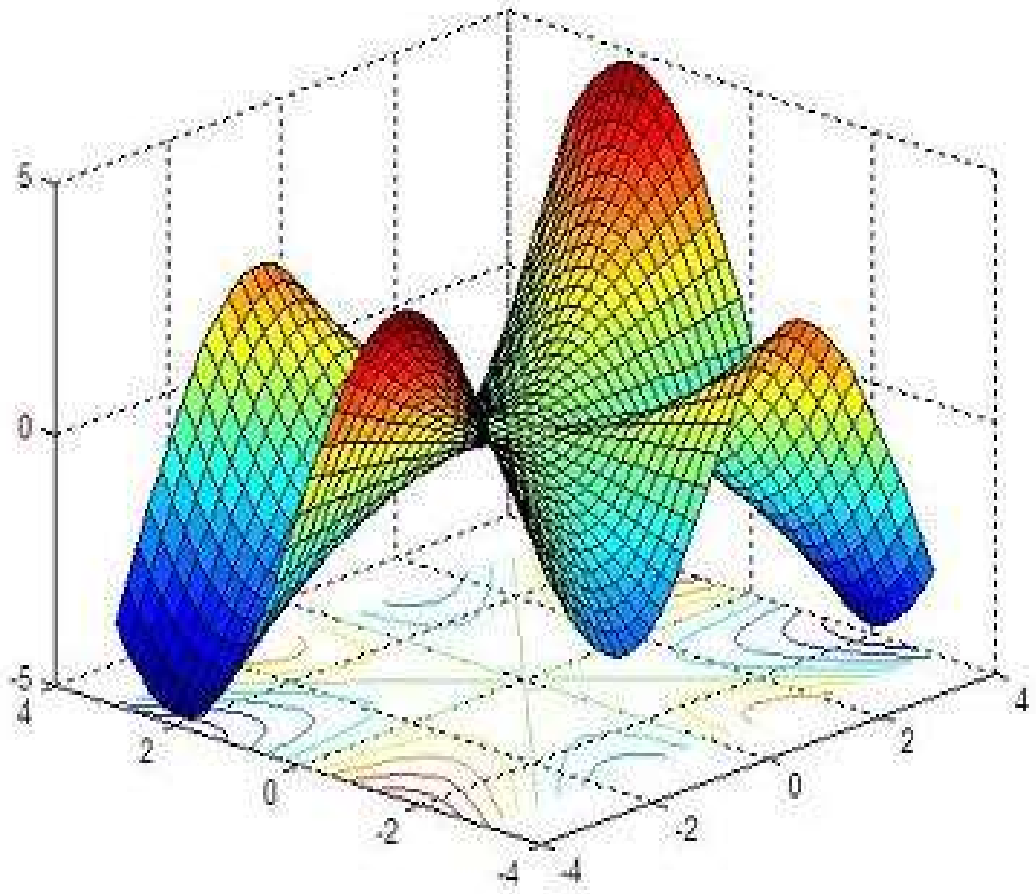
(b) Find the distance (magnitude)

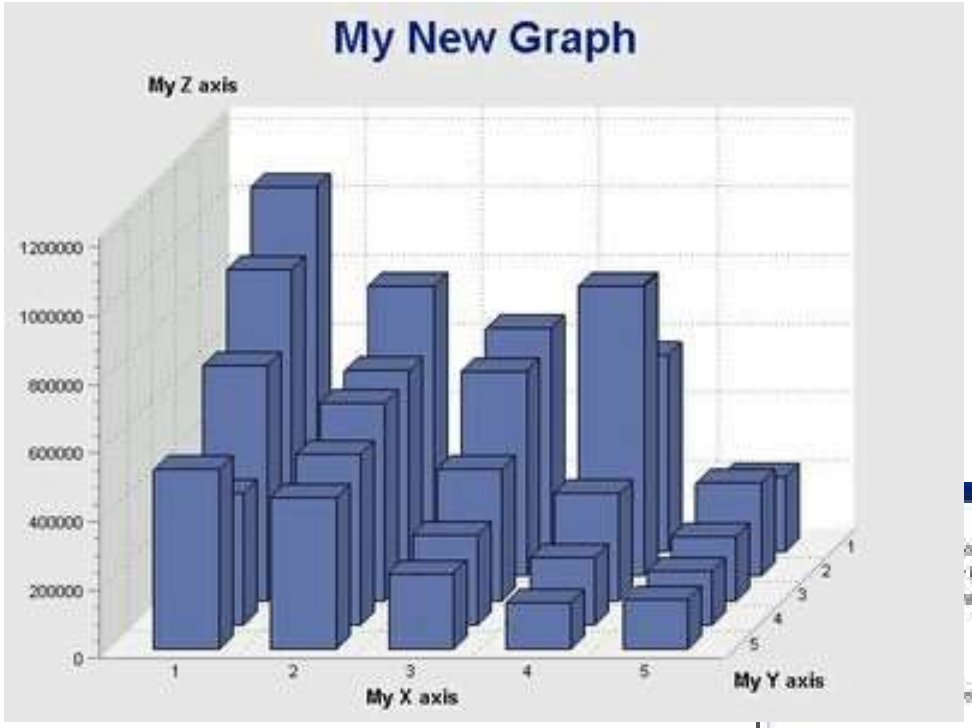
9.3 check even answers:

4. $\overrightarrow{PQ} = \langle -2, -6, -3 \rangle$ $\quad \left|\overrightarrow{PQ}\right| = 7$

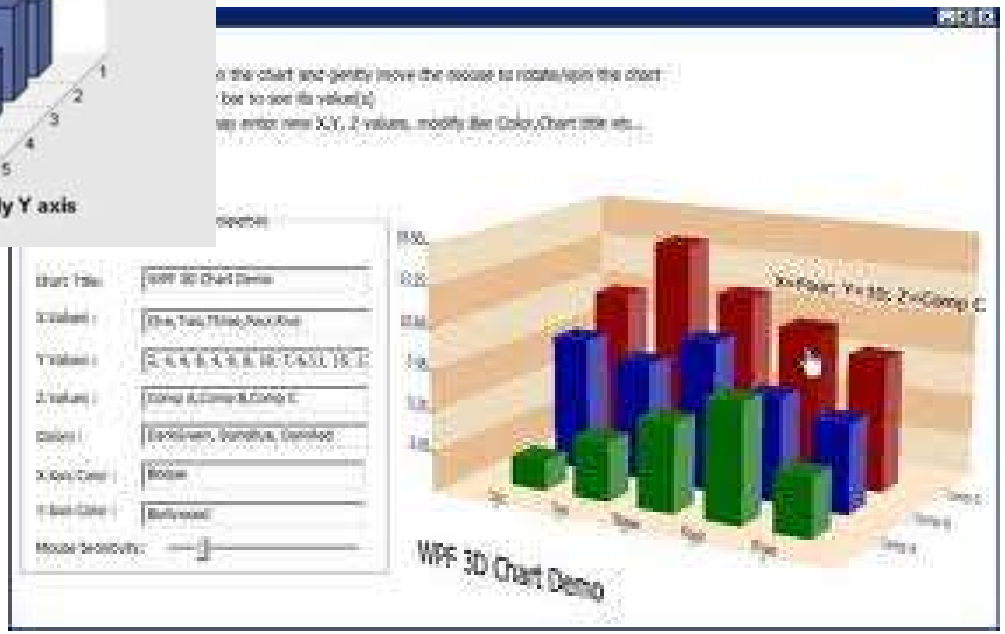
6. $\overrightarrow{PQ} = \langle 3, -3, 10 \rangle$ $\quad \left|\overrightarrow{PQ}\right| = \sqrt{118}$

3-D Graphing





Samples of 3-D graphs:



Samples of 3-D graphs: