

# Calc 3 - Assignment #1

Note Title

9/2/2011

- ① Which of the points  $P(6, 2, 3)$ ,  $Q(-5, -1, 4)$ , and  $R(0, 3, 8)$  is closest to the  $xz$ -plane? Which one lies in the  $yz$ -plane?
- ② Describe and sketch the surface in  $\mathbb{R}^3$  described by  $x + y = 2$
- ③ a) What does  $x = 4$  represent in  $\mathbb{R}^3$ . Sketch it.  
b) How about  $y = 3$ ? And  $z = 5$ ? How about all  $(x, y, z)$  for which  $y = 3$  and  $z = 5$ ?
- ④ Find distance of  $(3, 7, -5)$  to
- a)  $xy$ -plane      b)  $yz$ -plane      c)  $xz$ -plane  
d)  $x$ -axis      e)  $y$ -axis      f)  $z$ -axis
- ⑤ Find equation of a sphere center  $(2, -6, 4)$  and radius 5.
- ⑥ Find center and radius of the sphere
- a)  $x^2 + y^2 + z^2 - 6x + 4y - 2z = 11$   
b)  $4x^2 + 4y^2 + 4z^2 - 8x + 16y = 1$

② Find equation of largest sphere with center  $(7, 4, 9)$  contained in the first octant.

⑧ Is the triangle formed by  $P(3, -2, -3)$ ,  $Q(7, 0, 1)$ , and  $R(1, 2, 1)$  a right triangle?

Is it isosceles?

⑨ Describe the following regions in  $\mathbb{R}^3$ :

a)  $y \geq 0$

b)  $0 \leq z \leq 6$

c)  $x^2 + y^2 + z^2 \leq 3$

d)  $x^2 + y^2 + z^2 > 2z$

⑩ What is the relationship between  $(4, 7)$  and  $\langle 4, 7 \rangle$

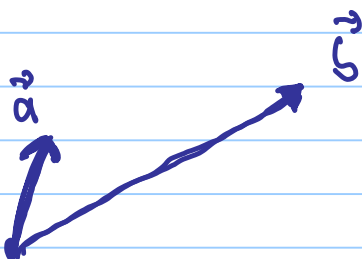
⑪ Find  $\vec{a} + \vec{b}$ ,  $2\vec{a} + 3\vec{b}$ ,  $\|\vec{a}\|$ , and  $\|\vec{a} - \vec{b}\|$  for

$\vec{a} = \langle 5, -12 \rangle$ ,  $\vec{b} = \langle -3, -6 \rangle$

⑫ Find a unit vector in the direction of  $(-9, 2, 4)$

⑬ Find a vector in direction  $(-2, 4, 2)$  with length 8.

⑭ Use the following vectors to sketch



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

b)  $\vec{a} - \vec{b}$

c)  $\vec{b} - 3\vec{a}$