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 (3,4,-5) to
   a) xy-plane  
   b) yz-plane  
   c) xy-plane  
   d) x-axis  
   e) y-axis  
   f) z-axis

5. Find equation of a sphere centered at (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) $4x^2 + 4y^2 + 4z^2 - 8x + 16y = 1$
3) Find equation of largest sphere with center 
(5, 4, 9) contained in the first octant.

8) Is the triangle formed by P(3, -2, -7), 
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) \( x^2 + y^2 + z^2 \leq 7 \)
   d) \( x^2 + y^2 + z^2 > 2z \)

10) What is the relationship between \( (4,7) \) and \( <4,7> \)?

11) Find \( \vec{a} + \vec{b} \), \( 2\vec{a} + 3 \vec{b} \), \( \|\vec{a}\| \), and \( \|\vec{a} - 3\vec{b}\| \) for 
\( \vec{a} = (5, -12) \), \( \vec{b} = (-3, -6) \)

12) Find a unit vector in the direction of \( <4,2,4> \)

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

14) Use the following vectors to sketch:

\[ \vec{a}, \quad \vec{b}, \quad \vec{c} \]

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

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

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