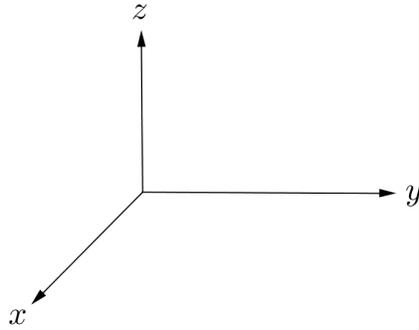


- 1) Sketch the points $P(6, 2, 3)$, $Q(-5, -1, 4)$, $R(1, 3, 8)$ and $S(2, -2, 2)$ on a single set of coordinate axes.



- 2) Which of the points from problem 1 is closest to:

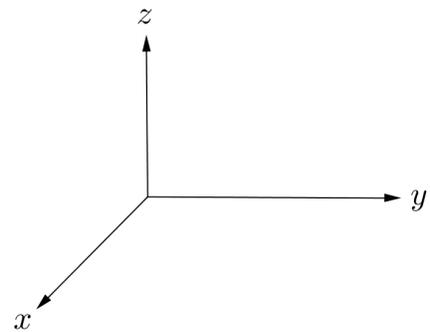
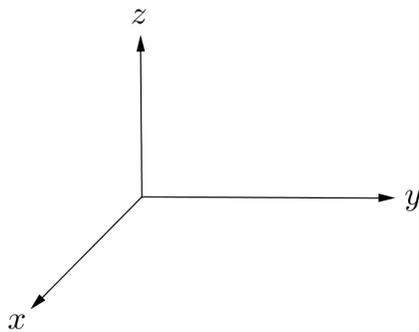
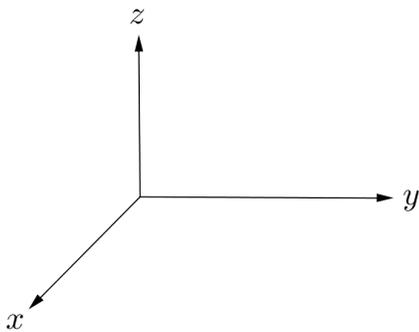
- a) xz - plane ?
- b) xy - plane ?
- c) yz - plane ?

- 3) What are the projections of point R from problem 1 on the:

- a) xz - plane ?
- b) xy - plane ?
- c) yz - plane ?

- 4) Describe and sketch the surface in \mathbb{R}^3 represented by the equation:

- a) $x = 3$
- b) $z = 5$
- c) $x + y = 2$



- 5) Determine whether the points lie on a straight line. $A(5, 1, 3)$, $B(7, 9, -1)$, $C(1, -15, 11)$
- 6) Find the lengths of the sides of the triangle with the indicated vertices, and determine whether the triangle is a right triangle, an isosceles triangle, or neither. $A(3, 4, 1)$, $B(0, 6, 2)$, $C(3, 5, 6)$
- 7) Find the standard equation of the sphere.
- a) Center: $(0, 2, 5)$, Radius: 2
 - b) Endpoints of a diameter: $(2, 0, 0)$, $(0, 6, 0)$
 - c) Center: $(-3, 2, 4)$, tangent to the yz -plane

8) Complete the square to write the equation of the sphere in standard form. Find the center and radius.

a) $x^2 + y^2 + z^2 + 9x - 2y + 10z + 19 = 0$

b) $4x^2 + 4y^2 + 4z^2 - 24x - 4y + 8z - 23 = 0$

9) Describe in words the region of \mathbb{R}^3 represented by the equation or inequality.

a) $y = -4$

b) $y \geq 0$

c) $0 \leq z \leq 6$

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

e) $x^2 + z^2 \leq 9$

10) Write inequalities to describe the region.

a) The region between xy -plane and horizontal plane $z = 5$

b) The solid cylinder that lies on or below the plane $z = 5$ and on or above the circular trace on the xy -plane with center located on the origin and radius 2.

c) The solid upper hemisphere of the sphere of radius 4 centered at the origin.