

## 12.1

13 Questions

3) Which of the points  $A(-4, 0, -1)$ ,  $B(3, 1, -5)$ , and  $C(2, 4, 6)$ , is the closest to the  $yz$ -plane? Which point lies in the  $xz$ -plane?

5) What does the equation  $x = 3$  represent in  $\mathbb{R}^2$ ? What does it represent in  $\mathbb{R}^3$ ? Illustrate with sketches.

7) Describe and sketch the surface in  $\mathbb{R}^3$ , represented by the equation  $x + y = 2$ .

**9)** Find the distance between the given points:  $(3, 5, -2)$ ,  
 $(-1, 1, -4)$

**11)** Find the lengths of the sides of the triangle  $PQR$ . Is it a right triangle? Is it an isosceles triangle?  $P(3, -2, -3)$ ,  $Q(7, 0, 1)$ ,  $R(1, 2, 1)$

27-39) Describe in words the region of  $\mathbb{R}^3$  represent by the equation(s) or inequalities.

27)  $z = -2$

29)  $y \geq 1$



$$31) \quad -1 \leq x \leq 2$$

33)  $x^2 + y^2 = 1, z = -1$

35)  $y^2 + z^2 \leq 25$

37)  $x^2 + y^2 + z^2 = 4$

**39)**  $1 \leq x^2 + y^2 + z^2 \leq 5$



## Answers

- 3) C; A
- 5) A line parallel to the y-axis and 4 units to the right of it; a vertical plane parallel to the yz-plane and 4 units in front of it.
- 7) A vertical plane that intersects the xy-plane in the line  $y = 2 - x, z = 0$
- 9) 6
- 11)  $|PQ| = 6, |QR| = 2\sqrt{10}, |RP| = 6$ ; isosceles triangle
- 27) A horizontal plane 2 units below the xy-plane
- 29) A half-space consisting of all points on or to the right of the plane  $y = 1$
- 31) All points on or between the vertical planes  $x = -1$ , and  $x = 2$
- 33) All points on a circle with radius 2 and center on the z-axis that is contained in the plane  $z = -1$
- 35) All points on or inside a circular cylinder of radius 5 with axis the x-axis
- 37) All points on a sphere with radius 2 and center  $(0, 0, 0)$
- 39) All points on or between spheres with radii 1 and  $\sqrt{5}$  and centers  $(0, 0, 0)$