

Homework Exercises #9

1.

$$z^2 + 4y^2 = 9$$

2.

$$9x^2 + 4y^2 + z^2 = 36$$

3.

$$y = 1 - x^2 - z^2$$

4.

$$4x^2 + 9z^2 = 9y^2$$

5.

$$\frac{x^2}{4} - \frac{z^2}{4} - y^2 = 1$$

6.

$$x^2 - y^2 = z$$

In Exercises 7-8 translate the equations from the given coordinate system (rectangular, cylindrical, spherical) into equations in the other two systems. Also, identify the set of points defined by the equation.

7.

$$\sqrt{x^2 + y^2} = z$$

8.

$$\rho = 6 \cos \phi$$

9. Describe the sets of points in space whose cylindrical coordinates satisfy the equation $r^2 = \cos 2\theta$. Sketch.
10. Describe the sets of points in space whose spherical coordinates satisfy the equation $\rho = 1 - \cos \phi$. Sketch. (*Hint:* The absence of θ indicates symmetry with respect to the z -axis. What is the trace of the surface in the xy -plane?)