

1) Convert the point from cylindrical coordinates to rectangular coordinates.

a) $(-7, 0, 5)$

b) $\left(6, -\frac{\pi}{4}, 2\right)$

a) $\boxed{(-7, 0, 5)}$

b) $\boxed{(3\sqrt{2}, -3\sqrt{2}, 2)}$

2) Convert the point from rectangular coordinates to cylindrical coordinates.

a) $(0, 5, 1)$

b) $(2\sqrt{2}, -2\sqrt{2}, 4)$

a) $\boxed{\left(5, \frac{\pi}{2}, 1\right)}$

b) $\boxed{\left(4, -\frac{\pi}{4}, 4\right)}$

3) Find an equation in cylindrical coordinates for the equation given in rectangular coordinates.

a) $z = 3$

b) $x = 9$

c) $x^2 + y^2 + z^2 = 17$

d) $y = x^2$

a) $\boxed{z = 3}$

b) $\boxed{r = 9 \sec \theta}$

c) $\boxed{r^2 + z^2 = 17}$

d) $\boxed{r = \sec \theta \tan \theta}$

4) Find an equation in rectangular coordinates for the equation given in cylindrical coordinates.

a) $r = 3$

b) $z = 2$

a) $\theta = \frac{\pi}{6}$

b) $r = 2 \cos \theta$

a) $x^2 + y^2 = 9$

b) $z = 2$

c) $x - \sqrt{3}y = 0$

d) $(x-1)^2 + y^2 = 1$

5) Convert the point from rectangular coordinates to spherical coordinates.

a) $(4, 0, 0)$

b) $(-1, 2, 1)$

a) $\left(4, 0, \frac{\pi}{2}\right)$

b) $\left(\sqrt{6}, \tan^{-1}(-2) + \pi, \cos^{-1} \frac{1}{\sqrt{6}}\right)$

6) Convert the point from spherical coordinates to rectangular coordinates.

a) $\left(4, \frac{\pi}{6}, \frac{\pi}{4}\right)$

b) $\left(6, \pi, \frac{\pi}{2}\right)$

a) $(\sqrt{6}, \sqrt{2}, 2\sqrt{2})$

b) $(-6, 0, 0)$

7) Find an equation in spherical coordinates for the equation given in rectangular coordinates.

- a) $y = 2$
- b) $z = 6$
- c) $x^2 + y^2 + z^2 = 49$
- d) $x^2 + y^2 = 2z^2$

a) $\rho = 2 \csc \phi \csc \theta$

b) $\rho = 6 \sec \phi$

c) $\rho = 7$

d) $\tan \phi = \pm\sqrt{2}$

8) Find an equation in rectangular coordinates for the equation given in spherical coordinates.

- a) $\rho = 5$
- b) $\theta = \frac{3\pi}{4}$
- c) $\phi = \frac{\pi}{6}$
- d) $\rho = 4 \csc \phi \sec \theta$

a) $x^2 + y^2 + z^2 = 25$

b) $x + y = 0$

c) $3x^2 + 3y^2 - z^2 = 0, z \geq 0$

d) $x = 4$

9) Convert the point from cylindrical coordinates to spherical coordinates.

a) $\left(4, \frac{\pi}{4}, 0\right)$

b) $\left(2, \frac{2\pi}{3}, -2\right)$

a) $\boxed{\left(4, \frac{\pi}{4}, \frac{\pi}{2}\right)}$

b) $\boxed{\left(2\sqrt{2}, \frac{2\pi}{3}, \frac{3\pi}{4}\right)}$

10) Convert the point from spherical coordinates to cylindrical coordinates.

a) $\left(10, \frac{\pi}{6}, \frac{\pi}{2}\right)$

b) $\left(18, \frac{\pi}{3}, \frac{\pi}{3}\right)$

a) $\boxed{\left(10, \frac{\pi}{6}, 0\right)}$

b) $\boxed{\left(9, \frac{\pi}{3}, 9\sqrt{3}\right)}$

11) Sketch the graph described by the given inequalities.

