Worksheet on Polar, Cylindrical and Spherical Coordinates

1. Plot the following polar points.

(a) $\left(2,\dfrac{\pi}{6}\right)$ (b) $\left(3,\dfrac{5\pi}{6}\right)$ (c) $\left(-2,\dfrac{\pi}{3}\right)$ (d) $\left(2,-\dfrac{\pi}{3}\right)$

2. Convert the following rectangular points to polar coordinates.

(a) $\left(1,\sqrt{3}\right)$ (b) $\left(-1,\sqrt{3}\right)$ (c) $\left(1,-\sqrt{3}\right)$ (d) $\left(-1,-\sqrt{3}\right)$

3. Convert the following rectangular points to cylindrical coordinates.

(a) $(1,-1,3)$ (b) $(-2,-2\sqrt{3},-1)$

4. Convert the following spherical points $\left(\rho,\varphi,\theta\right)$ to rectangular points (x,y,z).

(a) $\left(1,\dfrac{\pi}{3},\dfrac{\pi}{3}\right)$ (b) $\left(2,\dfrac{\pi}{6},\dfrac{\pi}{2}\right)$

5. Write an equation that describes the equation in polar coordinates.

(a) $x^2 + y^2 = 4$

(b) $x^2 + y^2 = 4y$

(c) $y = x$

(d) $x - y = 5$

6. Write an equation that describes the equation in cylindrical coordinates.

(a) $x^2 + y^2 + z^2 = 1$

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

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

7. Write an equation that describes the equation in spherical coordinates.

(a) $x^2 + y^2 + z^2 = 1$

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

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