

Steven Rosendahl
Homework 6

1. Find the Cartesian coordinates of the point whose polar coordinates are given.

$$\begin{aligned}(\sqrt{2}, \frac{\pi}{4}) &= (\sqrt{2} \cos(\frac{\pi}{4}), \sqrt{2} \sin(\frac{\pi}{4})) \\ &= (1, 1)\end{aligned}$$

2. Give a set of polar coordinates for the point whose Cartesian coordinates are given.

$$\begin{aligned}(-2, 2) &= (\sqrt{(-2)^2 + 2^2}, \arctan(-1)) \\ &= (\sqrt{4}, -\frac{\pi}{4}) \\ &= (2, -\frac{\pi}{4})\end{aligned}$$

3. Find the Cartesian coordinates of the point whose cylindrical coordinates are given.

$$\begin{aligned}(1, \frac{2\pi}{3}, -2) &= (\cos(\frac{2\pi}{3}), \sin(\frac{2\pi}{3}), -2) \\ &= (-\frac{1}{2}, \frac{\sqrt{3}}{2}, -2)\end{aligned}$$

4. Find the rectangular coordinates of the point whose spherical coordinates are given.

$$\begin{aligned}(1, \frac{3\pi}{4}, \frac{2\pi}{3}) &= (\cos \frac{3\pi}{4} \sin \frac{2\pi}{3}, \sin \frac{3\pi}{4} \sin \frac{2\pi}{3}, \cos \frac{3\pi}{4}) \\ &= (-\frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2}, \frac{-1}{\sqrt{2}})\end{aligned}$$

5. Find a set of cylindrical coordinates of the point whose Cartesian coordinate is given.

$$\begin{aligned}(-1, \sqrt{3}, 13) &= (\sqrt{(-1)^2 + (\sqrt{3})^2}, \arctan -\frac{1}{\sqrt{3}}, 13) \\ &= (2, -\frac{\pi}{6}, 13)\end{aligned}$$