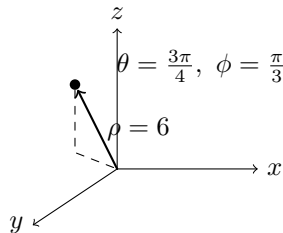


Question 2

Convert the spherical point $(\rho, \theta, \phi) = (6, 3\pi/4, \pi/3)$ to rectangular and cylindrical coordinates. Keep all values exact.

Question 2 – Solution

Strategy First compute the cylindrical radius $r = \rho \sin \phi$ and height $z = \rho \cos \phi$.



Cylindrical form

$$r = 6 \sin \frac{\pi}{3} = 3\sqrt{3}, \quad z = 6 \cos \frac{\pi}{3} = 3.$$

Hence $(r, \theta, z) = (3\sqrt{3}, 3\pi/4, 3)$.

Rectangular form

$$x = 3\sqrt{3} \cos \frac{3\pi}{4} = -\frac{3\sqrt{6}}{2}, \quad y = 3\sqrt{3} \sin \frac{3\pi}{4} = \frac{3\sqrt{6}}{2}.$$

Therefore

$$(x, y, z) = \left(-\frac{3\sqrt{6}}{2}, \frac{3\sqrt{6}}{2}, 3 \right).$$