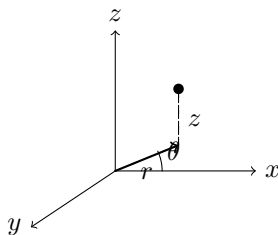


Question 1

Convert the rectangular point $(-3, 3\sqrt{3}, 5)$ to cylindrical coordinates using the convention $r \geq 0$ and $0 \leq \theta < 2\pi$. Verify by converting back.

Question 1 – Solution

Strategy Compute r first, then place the angle in the correct quadrant.



Conversion

$$r = \sqrt{(-3)^2 + (3\sqrt{3})^2} = 6.$$

Because $x < 0$ and $y > 0$, the point lies in Quadrant II. With $\tan \theta = -\sqrt{3}$, $\theta = 2\pi/3$. Hence

$$(r, \theta, z) = \left(6, \frac{2\pi}{3}, 5\right).$$

Verification $x = 6 \cos(2\pi/3) = -3$, $y = 6 \sin(2\pi/3) = 3\sqrt{3}$, and $z = 5$.