

Question 2

Convert $(r, \theta, z) = (4, 7\pi/6, -2)$ to Cartesian coordinates and determine its distance from the z -axis and from the origin.

Tasks

1. Find (x, y, z) .
2. Find both distances.
3. Verify the radial identity.

Question 2 – Solution

Strategy. Use $x = r \cos \theta$, $y = r \sin \theta$; radial distance is r when $r \geq 0$.

Step 1: Convert Since $\cos(7\pi/6) = -\sqrt{3}/2$ and $\sin(7\pi/6) = -1/2$,

$$\boxed{(x, y, z) = (-2\sqrt{3}, -2, -2)}.$$

Step 2: Distances Distance to the z -axis is $\sqrt{x^2 + y^2} = 4$. Distance to the origin is

$$\sqrt{x^2 + y^2 + z^2} = \sqrt{16 + 4} = \boxed{2\sqrt{5}}.$$

Verification. $x^2 + y^2 = 12 + 4 = 16 = r^2$, confirming the conversion and axis distance.