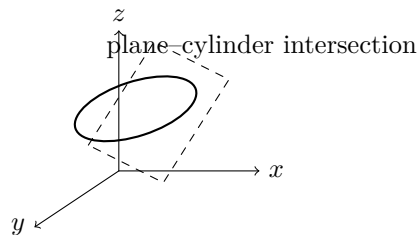


Question 6

Find a one-parameter vector representation for the curve where the cylinder $x^2 + y^2 = 4$ meets the plane $z = x + y$. State an interval that traces the curve exactly once.

Question 6 – Solution

Strategy The cylinder fixes $r = 2$; use $\theta = t$ and substitute into the plane.



Coordinates

$$x = 2 \cos t, \quad y = 2 \sin t, \quad z = x + y = 2 \cos t + 2 \sin t.$$

Therefore

$$\boxed{\vec{r}(t) = \langle 2 \cos t, 2 \sin t, 2 \cos t + 2 \sin t \rangle}, \quad 0 \leq t < 2\pi.$$

Verification The first two components satisfy $x^2 + y^2 = 4$, and the third is their sum. The half-open interval prevents duplicating the starting point.