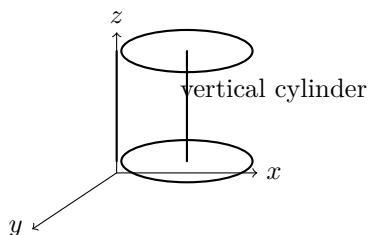


Question 2

Rewrite the surface $x^2 + y^2 = 4x$ in cylindrical coordinates. Identify the surface geometrically, including its axis and radius.

Question 2 – Solution

Strategy Replace $x^2 + y^2$ by r^2 and x by $r \cos \theta$.



Cylindrical equation

$$r^2 = 4r \cos \theta.$$

The equation $r = 4 \cos \theta$ describes the non-axis points; $r = 0$ is already included, so

$$\boxed{r = 4 \cos \theta}.$$

Geometry In rectangular form,

$$(x - 2)^2 + y^2 = 4.$$

Thus the surface is a vertical circular cylinder of radius 2, whose axis is the line $\boxed{x = 2, y = 0}$ parallel to the z -axis.