

11.1 #12

Consider the equation

$$x^2 + z^2 - 4x - 8z + 13 = 0$$

$$x^2 - 4x + z^2 - 8z + 13 = 0$$

Complete the square.

$$x^2 - 4x + 4 - 4 + z^2 - 8z + 16 - 16 + 13 = 0$$

$$(x-2)^2 + (z-4)^2 = 4 + 16 - 13 = 7 \quad (\text{Cylinder})$$

Since the original inequality involved $>$,

$$x^2 + z^2 - 4x - 8z + 13 > 0$$

represents all the points outside the cylinder $(x-2)^2 + (z-4)^2 = 7$.