Homework #1 • MATH 251 • Coordinates in Three Dimensions

a) Describe the geometry of the set of points whose coordinates (x, y, z) satisfy the equation:

$$x^2 + y^2 + z^2 + 4x + 2y - 6z - 22 = 0 \ .$$

b) Show that the intersection of the object in part **a)** with the yz-plane is a circle. As a first step, express the points of the intersection using the set notation where there are two conditions after the *such that*:

$$\mathcal{S} = \{ \ (x, y, z) \mid \ \ldots \ \text{ and } \ \ldots \ \}$$

For the second step, combine the two conditions to find the 2D equation for the intersection points. Finally, after recognizing that the set of intersection points is indeed a circle, determine its radius.