

Provide a clear and organized presentation.

1. Consider the sphere whose equation is  $x^2 + y^2 + z^2 - 2\sqrt{3}x + 4y - 8z + 67 = 0$ 
  - i) Determine the radius and the center of this sphere in  $\mathbb{R}^3$
  - ii) Determine in both words and mathematical notation the intersection of this sphere and the  $yz$ -coordinate plane.
  - iii) Determine in both words and mathematical notation the intersection of this sphere and the  $xz$ -coordinate plane.
  
2. Describe in words the collection of points in  $\mathbb{R}^3$  that satisfy the following inequality:

$$0 < y \leq 2$$