Question 1:
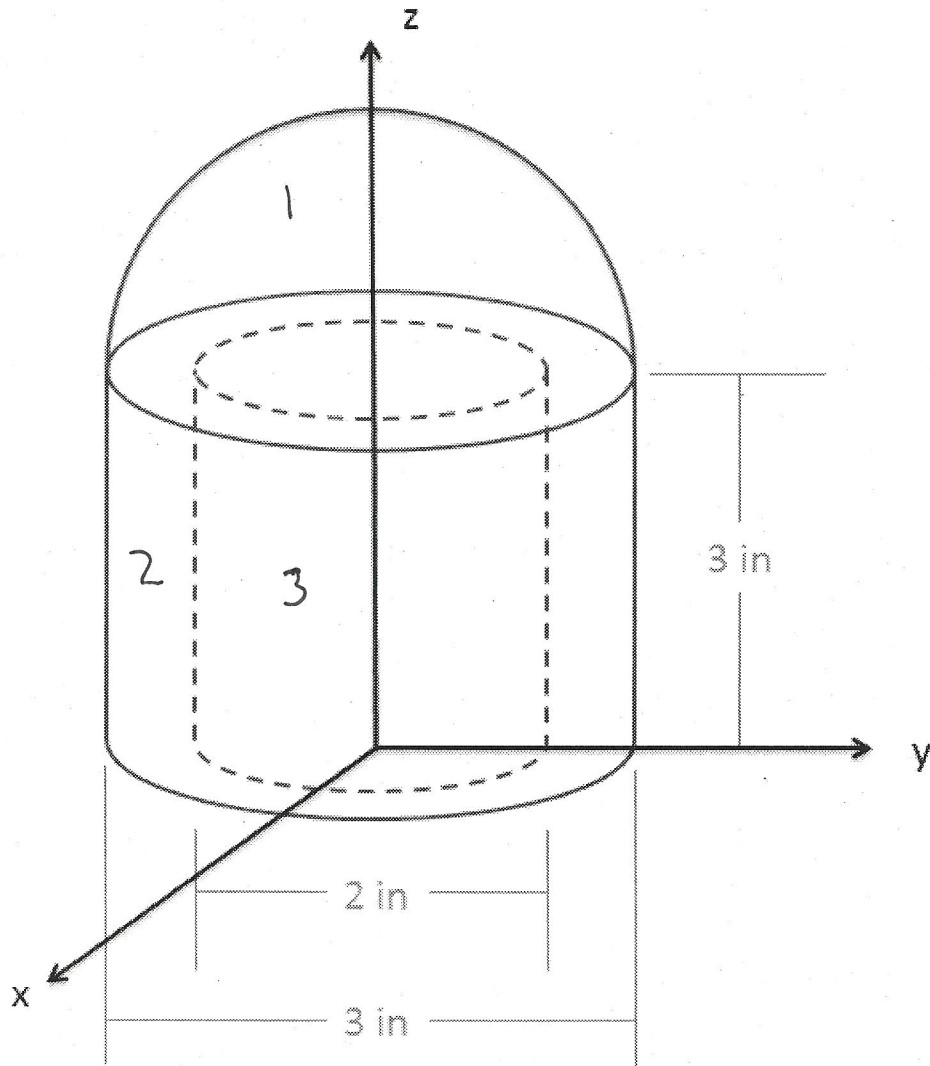
The shape shown below is made of a uniform material and consists of a solid semicircular hemisphere on top of a hollow cylinder. Based on the dimensions below, determine the location of the ~~center of mass~~.
centroid

Because of symetry

$$\bar{X} = 0$$

$$\bar{Y} = 0$$

Shape	Volume	$\bar{Z}_i$
1	7.07 in^3	3.56in $\leftarrow \frac{(3)(1.5)}{8} + 3$
2	21.2 in^3	1.5in
3	-9.42 in^3	1.5in

$$\bar{Z} = \frac{(7.07)(3.56) + (21.2)(1.5) + (-9.42)(1.5)}{7.07 + 21.2 - 9.42}$$

$$\bar{Z} = 2.27\text{in}$$

Solution

$$\bar{X} = 0\text{in} \quad \bar{Y} = 0\text{in} \quad \bar{Z} = 2.27\text{in}$$