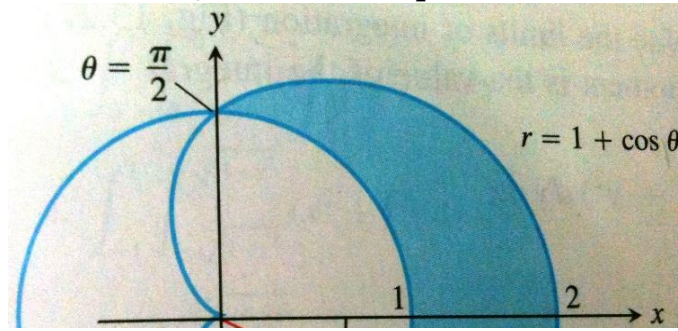
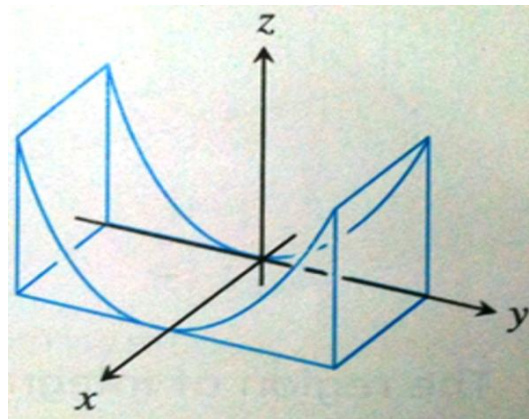


- I-** Consider the region R that lies inside the upper part of the cardioid $r = 1 + \cos \theta$ and outside the semi-circle $r = 1$, as shown in the figure below. (6-pts)



- Redraw the above region.
 - Use polar coordinates to evaluate the area of the region R .
- II-** Consider the solid region between the cylinder $z = y^2$ and the $xy - plane$ that is bounded by the planes $x = 0$, $x = 1$, $y = -1$ & $y = 1$. (7-pts)



- Redraw region.
 - Write in two different triple iterated integrals with their different orders of integration that represent the above solid region.
 - Use **triple integration** to calculate the **volume** of the given solid.
- III-** Consider the region R bounded by the curves $y = x$ and $y = x^2$ (7-pts)
- Draw the above region R .
 - Find the area of the region R .
 - Prove that the centroid of the given region R is of coordinates $(\frac{1}{2}, \frac{2}{5})$.