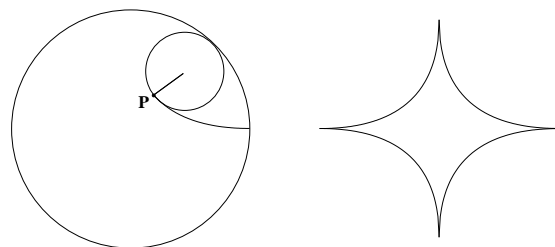


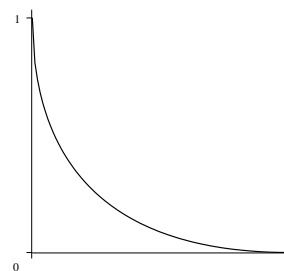
Name _____

Quiz Section _____

In this worksheet we are going to practice computing some more volumes of solids of revolution. These will all be based on a curve called the “astroid”. This curve is formed by rolling a small wheel around the inside of a larger one (see the picture). If the radius of the small wheel is one quarter the radius of the big one, a point P on the small wheel will trace out the four pointed curve shown on the far right. It’s called the astroid because it looks like a star.



1 If the radius of the big wheel is taken to be one, the astroid can be shown to have the equation $x^{2/3} + y^{2/3} = 1$. Use disks to compute the volume of the solid generated by rotating the part of the astroid in the first quadrant around the y -axis.



2 Use cylindrical shells to compute the volume of the solid generated by rotating the first quadrant portion of the astroid about the x -axis. (Hint: Try the substitution $u^3 = y^2$, so $3u^2 du = 2y dy$.) How does this compare with your answer in Problem 1? Can you explain this geometrically?

3 Use any method you wish to compute the volumes of the solids generated by rotating the first quadrant portion of the astroid about the lines $x = 1$ and $y = -1$. **Set up only. Do not compute the integrals.**