

1 | an example: semicircle revolved around the x-axis to create a sphere

We can make cuts perpendicular to the axis of rotation. In this case, you end up with a bunch of circular disks, where the height of each slice is your semicircle function.

Thus, the volume of the disk is

$$\pi f^2(x_i)\Delta x = (a^2 - x_i^2)\pi\Delta x$$

This is kinda like a Riemann Sum, but with more stuff added on. We can take the limit of the sum

$$\lim_{n \rightarrow \infty} \sum_{k=1}^n \pi(a^2 - x_i^2)\Delta x$$