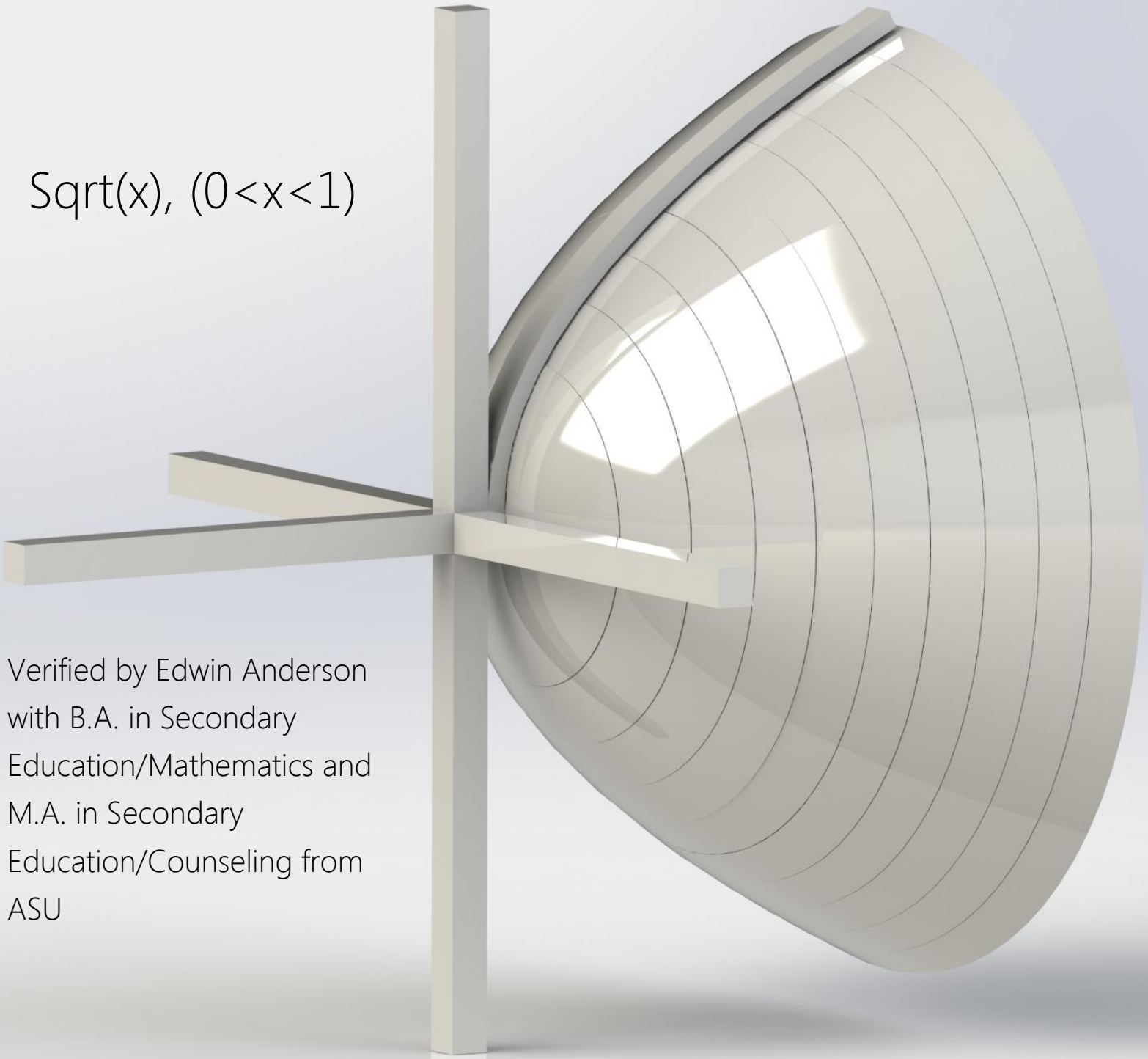
Disk Method

Sqrt(x), (0<x<1)



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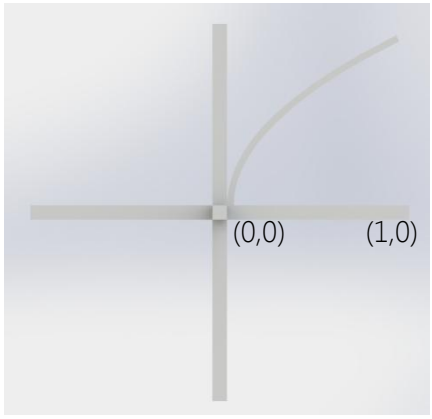
Preface

The 3D printed tactile model included in this demonstration is designed to teach the basic concepts of the disk method. This print guide serves as an aid to get the most out of the tactile model.

The **Disk Method**, also known as the method of disks or rings, is a way to calculate the volume of a solid of revolution by taking the sum of cross-sectional areas of infinitesimal thickness of the solid.

$$\int_0^1 \pi \sqrt{x}^2 \, dx$$

This integral wants us to find the volume bounded by the function sqrt(x) from 0 to 1



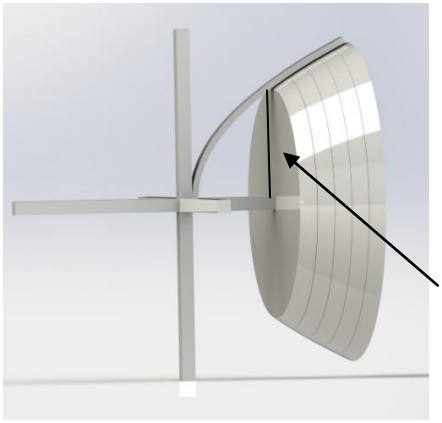
Let's break this integral down into parts

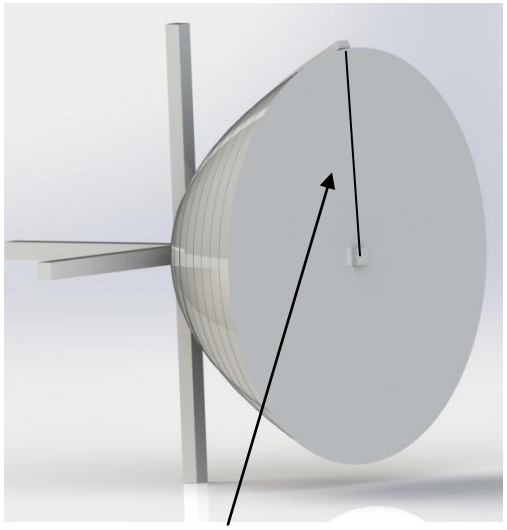
$$\int_0^1$$

This portion of the integral states that the variable, x, is between the values 0 and 1. In other words, it tells us that we are adding the volume of all the disks from 0 to 1.

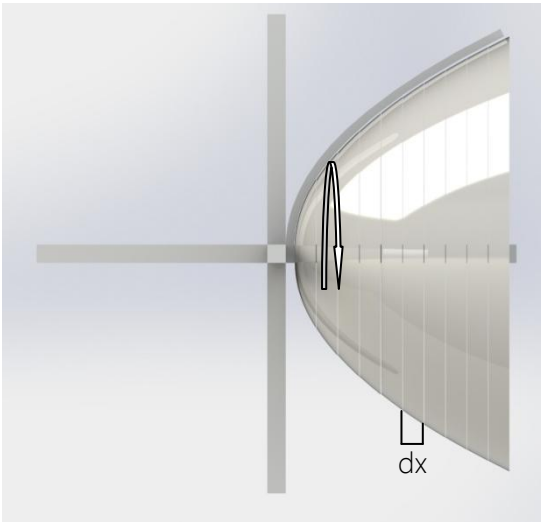
$$\pi \sqrt{x}^2$$

This portion of the integral is simply πr^2, or the formula for the area of a disk. In our case the radius would be our function, (sqrt(x)), which is constantly changing.





Radius (the distance in the y-direction between the function (sqrt(x)) and the x-axis)



dx This portion is called the depth. Theoretically this depth is infinitesimally small, but for our demonstration it is what is labeled. Furthermore, this also tells us that we are rotating the function about the x-axis; it says dx not dy.

The result of $\pi \sqrt{x}^2$ multiplied by dx is the volume of a disk.

(In our case, the diagram shows 10 disks, but theoretically there are an infinite amount of disks.)

$\int_0^1 \pi \sqrt{x}^2 \, dx$ Basically all this integral wants us to do is to add up the volume of all the disks from x equals 0 to x equals 1.

The solution of the integral is pi/2