Calculus Lesson 5.2 (Day 1): Volumes of Rotation

I can...

... find the volume of regions rotated around the x or y axis.

Definition of Volume: Let S be a solid that lies between a and b.

If the cross-sectional area of *S* lies in the plane *P*, through *x* and perpendicular to the *x*-axis, is A(x), where *A* is a continuous function, then the volume of *S* is:

$$V = \lim_{n \to \infty} \sum_{i=1}^{n} A(x_i) \Delta x = \int_{a}^{b} A(x) dx$$

Method 1: DISK as an approximating cylinder

Area of a circle $A = \pi r^2$

Volume of approximating cylinder $V = A(x)\Delta x$

Example: Find the volume of a solid obtained by rotating about the x-axis the region under the curve $y = \sqrt{x}$ from x = 0 to x = 1.

Sketch of the curve:

Sketch of solid with approximating cylinder





Example 2: Find the volume of the solid obtained by rotating the region bounded by $y = x^3$, y = 8 and x = 0 about the *y*-axis.

