# MATH 152

## Today

1. WeBWorK/Questions
2. 7.2 Volumes of solids
3. 7.3 Volumes by cylindrical shells

**Goals:**

1. 7.2 Volumes of solids (Understand how to use integrals to find volumes via cross sections)
2. 7.3 Volumes by cylindrical shells (Understand how to use the shell method to compute volumes and how to choose which method to use)

## Where is today's material used?

1. Physics: distance traveled by a particle (among many others)
2. Chemistry: fraction of gas molecules that can participate in a reaction (among many others)
3. Economics: finding total cost given marginal cost (among many others)
4. Any discipline that includes a notion of accumulated change.

## 7.2 Volumes of solids (cont)

1. Examples: 7.2, p. 378: A selection.

## 7.3 Volumes by cylindrical shells

1. Let $f$ be a continuous function of $x$ on $[a, b]$, and let $S$ be the solid obtained by revolving the graph of $f$ between $a$ and $b$ about the $y$-axis. Then
$$V(S) = \int_a^b 2\pi x f(x) dx.$$

2. Let $g$ be a continuous function of $y$ on $[a, b]$, and let $S$ be the solid obtained by revolving the graph of $g$ between $a$ and $b$ about the $x$-axis. Then
$$V(S) = \int_a^b 2\pi y g(y) dy.$$

3. In both cases, the $x$ or $y$ can be replaced by a function $\rho(x)$ or $\rho(y)$, respectively, giving the radius of the shell in the case that the axis of revolution is not the $x$- or $y$-axis.

4. Examples: 7.3, p. 384: 3-7, 9-14

# Next Time

1. 7.4 Arc Length

2. 7.6 Work

3. Turn in WeBWorK 7.2 Set13-VolumeI: 5 and 7.3 Set14-VolumeII: 2, 6