Calculus
Chap. 7 section 3
Targets with examples

Name: _____
Date: _____
Period: _____

Applications of Integrals

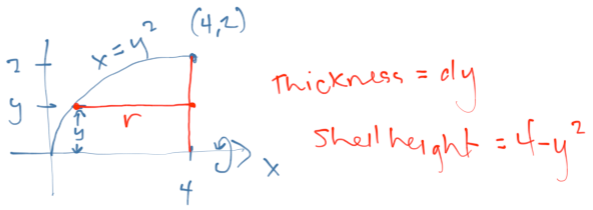
Integrals are powerful tools for solving problems.

7C Understanding Solids of Known Cross Sections

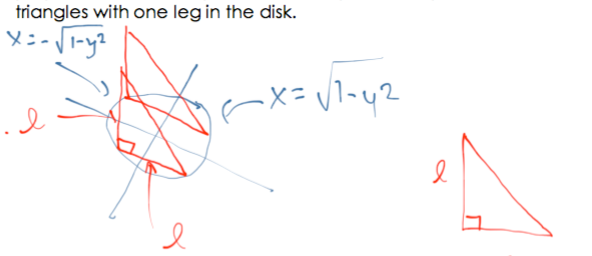
1. Find volumes using the disc and washer methods
2. Find volumes of solids not formed by rotation
3. Use *dx* and *dy* cross sections

[7.3] 1 - 49 odd

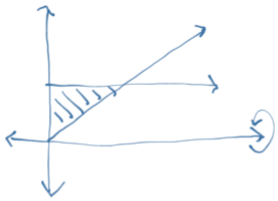
Find volumes using the disc and washer methods

Sample Question	The region bounded by the curve $y = \sqrt{x}$, the x-axis, and the line x = 4 is revolved about the x-axis to generate a solid. Find the volume of the solid.
Sample Response	Show / Hide Answer The region bounded by the curve $y = \sqrt{x}$, the x-axis, and the line x = 4 is revolved about the x-axis to generate a solid. Find the volume of the solid.  $V = \int_0^2 2\pi\,(\text{S. RADIUS})(\text{S. HEIGHT})\,dy$ $= \int_0^2 2\pi(y)(4-y^2)\,dy = \frac{8}{y}$

Find volumes of solids not formed by rotation

Sample Question	Find the volume of the solid: The base of the solid is the disk $x^2 + y^2 \le 1$. The cross sections by planes perpendicular to the y-axis between y = -1 and y = 1 are isosceles right triangles with one leg in the disk.
Sample Response	Show / Hide Answer Find the volume of the solid: The base of the solid is the disk $x^2 + y^2 \le 1$. The cross sections by planes perpendicular to the y-axis between y = -1 and y = 1 are isosceles right triangles with one leg in the disk.  $x^2 = 1 - y^2$ $x = \pm\sqrt{1-y^2}$ $\text{AREA} = \frac{\ell^2}{2}$ $\ell = \sqrt{1-y^2} - -\sqrt{1-y^2}$ $\ell = 2\sqrt{1-y^2}$ $\int_{-1}^{1} \frac{1}{2} \cdot (2\sqrt{1-y^2})^2 = \frac{8}{3}$ UNITS^3

Use dx and dy cross sections

Sample Question	Find the volume of the solid generated by revolving the region bounded by the lines and curves about the x-axis $y = x,\ y = 1,\ x = 0$
Sample Response	Show / Hide Answer Find the volume of the solid generated by revolving the region bounded by the lines and curves about the x-axis $y = x,\ y = 1,\ x = 0$  $\pi \int_0^1 (1^2 - x^2)\,dx$ $\pi \int_0^1 (1 - x^2)\,dx = \frac{2\pi}{3}$