

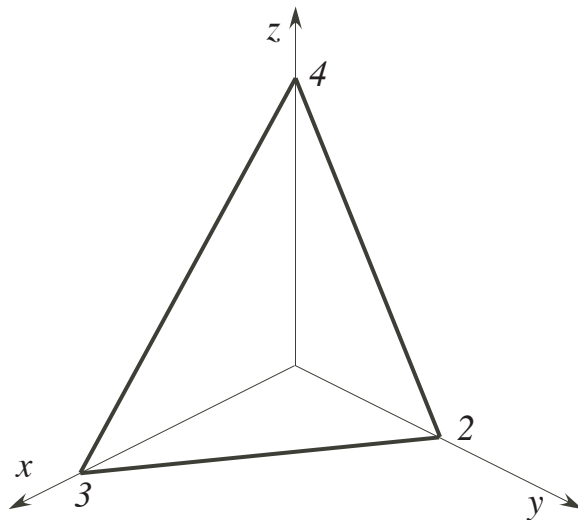
Math 10360 – Example Set 03A
Section 6.1: Area Between Curve

Section 6.2: Setting up Integral: Volume of a Solid with Uniform Cross-section

Area Between Two Curves (6.1). Assuming that $f(x) > g(x)$ for $a \leq x \leq b$, find the area between the curves $y = f(x)$ and $y = g(x)$ using Riemann sum. Draw a picture below representing the area you found and its integral formula.

Area = _____

1. Find the area enclosed by the graphs of $y = x^3 - x$ and $y = 3x$. Give a sketch of the graphs first.
2. Find the area bounded between the two curves $x = \sin y$ and $x = \sin 2y$ for $0 \leq y \leq \pi$. (You may use the identity $\sin 2y = 2 \sin y \cos y$.)
3. Find the volume of the solid shown below by integrating the area of vertical cross-section perpendicular to the x -axis.



4. Consider a solid whose base is the region bounded by the lines $y = x^3$, $y = 8$, and the y -axis. Find the volume of the solid in each of the following cases:
 - a. The cross sections perpendicular to the y -axis are squares.
 - b. The cross sections perpendicular to the y -axis are rectangles of height \sqrt{y} .
 - c. The cross sections perpendicular to the y -axis are semicircles.

Math 10360 – Example Set 03B

Section 6.2: Setting up Integral: Density, Average of a Continuous Function

6.2 - Density Examples

1. Find the total mass of the a 5 meter rod whose linear density is given by $\rho(x) = \frac{e^x}{(1 + e^x)^2}$ g/m for $0 \leq x \leq 5$.

2. A variety of deep sea worm is distributed about a hydrothermal vent according to the population density

$$\rho(r) = \frac{8000}{9 + r^2}$$

thousand per sq. miles where $1 \leq r \leq 3$ is the distance (in miles) from the vent. Find the total population of the sea worm.

6.2 - Average of a function.

The average of a function $f(x)$ over the interval $a \leq x \leq b$ is given by:



3. Recall that the balance $B(t)$ of an account earning interest for t years at an annual rate r (in decimal) compounded continuously with principle $\$P$ is given by

$$B(t) = Pe^{rt}.$$

Find the average amount of money over the first 10 years in an account earning interest at an annual rate of 4% compounded continuously if the principle is \$5000. Draw a graph of the balance in the account and mark the value that represents the average amount of money. Find the time it takes the account to reach this average.

Math 10360 – Example Set 03C
Section 6.2: Density
Section 6.3: Volumes of Revolution

6.2 - Density Examples

1. Semicircular plate of radius 3 in has radial weight density $\rho(r) = \frac{3}{\sqrt{r}}$ lb/in². Find the total weight of the plate. Comment on your answer. Does it make sense?

6.3/6.4 - Volumes of Revolution & The Method of Cylindrical Shells

2. Find the volume of the solid formed by rotating the region between the curve $y = 4 - x^2$ and x -axis for $-2 \leq x \leq 2$ about (a) the x -axis, (b) about the line $y = -1$, and (c) $x = 3$.