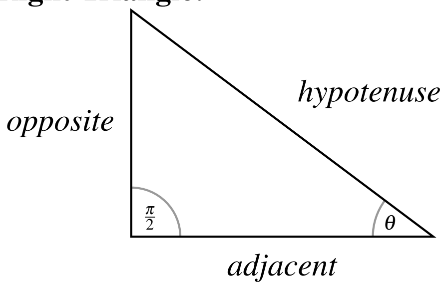
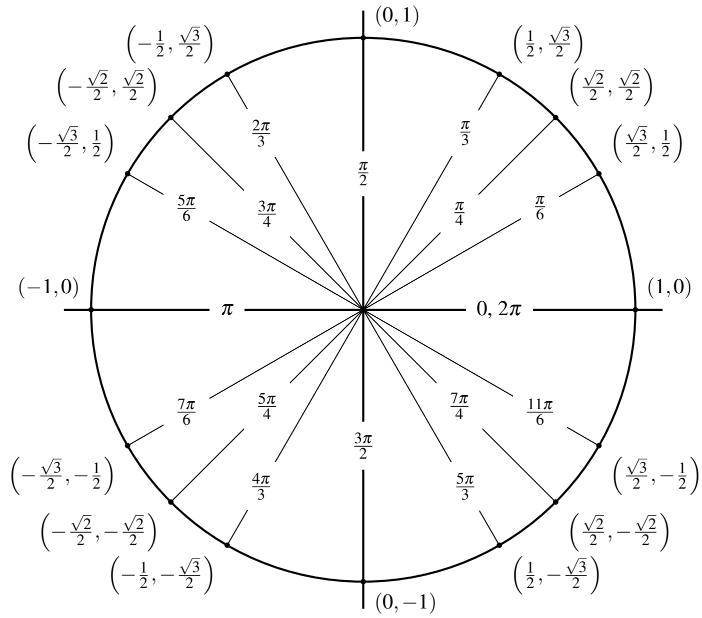
Right Triangle:



Pythagorean Identity: $(opp)^2 + (adj)^2 = (hyp)^2$

$$\sin(\theta) = \frac{opp}{hyp}$$
$$\cos(\theta) = \frac{adj}{hyp}$$
$$\tan(\theta) = \frac{opp}{adj}$$

Unit Circle:
Output of cosine corresponds to the x-values on the unit circle while output of sine corresponds to y-values. For example: $\cos(\frac{\pi}{6}) = \frac{\sqrt{3}}{2}$ while $\sin(\frac{\pi}{6}) = \frac{1}{2}$.



Fundamental Trig Identities:

- $\sin^2(\theta) + \cos^2(\theta) = 1$
- $\sec(\theta) = \dfrac{1}{\cos(\theta)}$
- $\tan(\theta) = \dfrac{\sin(\theta)}{\cos(\theta)}$
- $\csc(\theta) = \dfrac{1}{\sin(\theta)}$
- $\cot(\theta) = \dfrac{1}{\tan(\theta)}$

Rules of logarithms: Suppose $x, y > 0$.

- $\ln(x) + \ln(y) = \ln(xy)$
- $\ln(x^a) = a\ln(x)$
- $\ln(1) = 0$
- $\ln(x) - \ln(y) = \ln\left(\frac{x}{y}\right)$
- $\ln(e) = 1$
- $\log_b(x) = \dfrac{\ln(x)}{\ln(b)}$

Rules of exponents: Suppose $b > 0$.

- $b^x b^y = b^{x+y}$
- $(b^x)^y = b^{xy}$
- $\dfrac{b^x}{b^y} = b^{x-y}$
- $b^0 = 1$ (so $e^0 = 1$)

Straight line:

- Slope of the line passing through points (x_1, y_1) and (x_2, y_2) is given by $m = \frac{y_2 - y_1}{x_2 - x_1}$.
- An equation of the line with slope m and y-intercept b is $y = mx + b$.
- An equation of the line through point (x_1, y_1) and having slope m is $y - y_1 = m(x - x_1)$, or $y = y_1 + m(x - x_1)$.

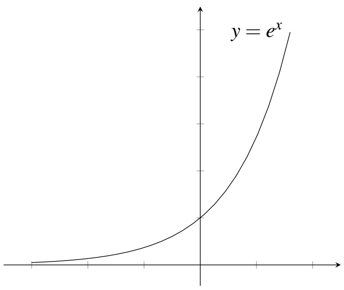
Quadratic formula:

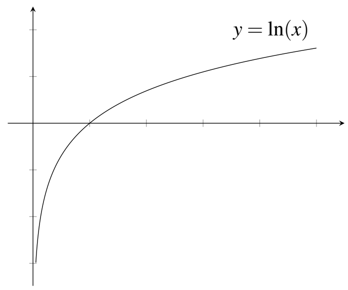
If $ax^2 + bx + c = 0$ is an equation with $a \neq 0$, then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

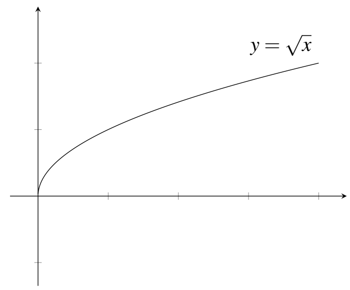
Area and Volume formulas:

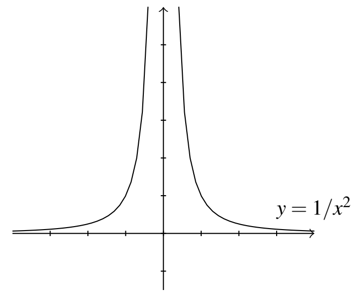
- Rectangle
  $A = bh$
- Triangle
  $A = \frac{1}{2}bh$
- Box
  $V = \ell wh$
- Circle
  $A = \pi r^2$
- Cylinder
  $V = \pi r^2 h$

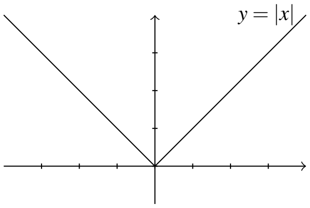
Graph of functions:

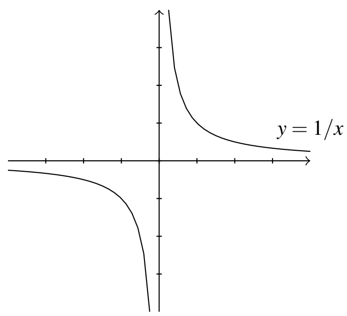


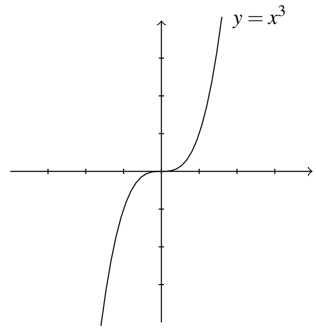


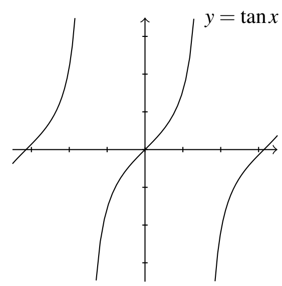


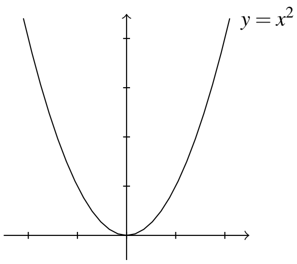


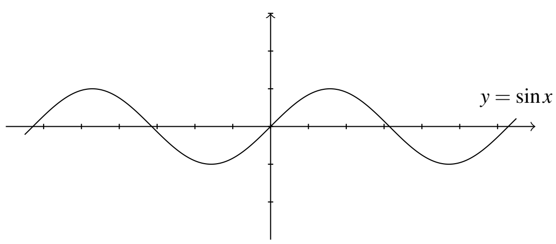


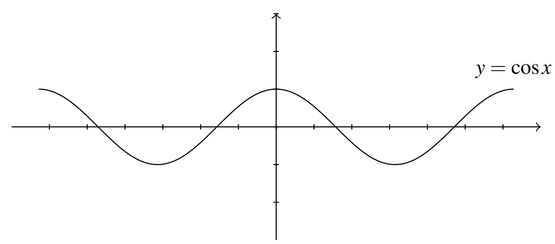












Transformation of graphs:

Shifts: Suppose $c > 0$

$y = f(x) + c$, shift the graph of $y = f(x)$ a distance c units upward
$y = f(x) - c$, shift the graph of $y = f(x)$ a distance c units downward
$y = f(x + c)$, shift the graph of $y = f(x)$ a distance c units to the left
$y = f(x - c)$, shift the graph of $y = f(x)$ a distance c units to the right

Scaling: Suppose $c > 1$

$y = cf(x)$, stretch the graph of $y = f(x)$ vertically by a factor of c
$y = (1/c)f(x)$, compress the graph of $y = f(x)$ vertically by a factor of c
$y = f(cx)$, compress the graph of $y = f(x)$ horizontally by a factor of c
$y = f(x/c)$, stretch the graph of $y = f(x)$ horizontally by a factor of c

Reflection:

$y = -f(x)$, reflect the graph of $y = f(x)$ about the x-axis.
$y = f(-x)$, reflect the graph of $y = f(x)$ about the y-axis.

An *even* function satisfies $f(-x) = f(x)$.
An *odd* function satisfies $f(-x) = -f(x)$.

Inverse Functions:

$a = f^{-1}(b)$ means $f(a) = b$, for one-to-one functions f.
$\theta = \arccos(x)$ means $\cos(\theta) = x$ and $0 \leq \theta \leq \pi$.

$\theta = \arcsin(x)$ means $\sin(\theta) = x$ and $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$.
$\theta = \arctan(x)$ means $\tan(\theta) = x$ and $\frac{\pi}{2} < \theta < \frac{\pi}{2}$.