Catalog of Functions for Calculus
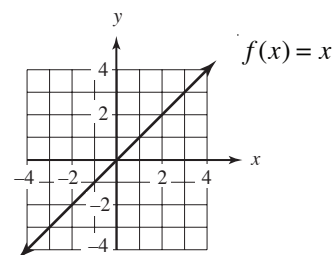
Constant Function

$f(x) = c$
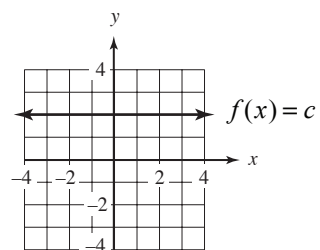
Domain: $(-\infty, \infty)$

Range: $[c, c]$

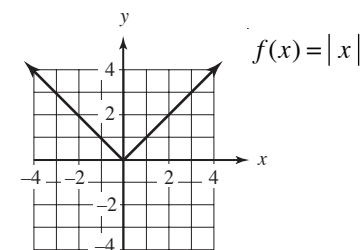## Identity Function

$f(x) = x$

Domain: $(-\infty, \infty)$

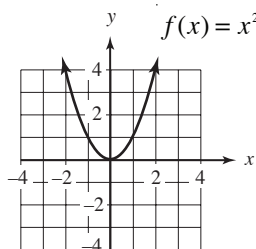Range: $(-\infty, \infty)$

Absolute Value Function

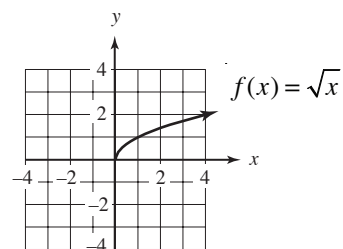$f(x) = |x|$

Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

Squaring Function

$f(x) = x^2$

Domain: $(-\infty, \infty)$

Range: $[0, \infty)$
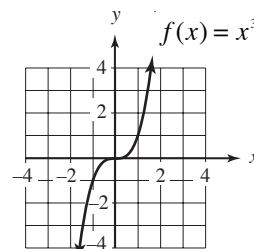
Square Root Function

$f(x) = \sqrt{x}$

Domain: $[0, \infty)$

Range: $[0, \infty)$

Cubing Function

$f(x) = x^3$

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

Cube Root Function

$f(x) = \sqrt[3]{x}$
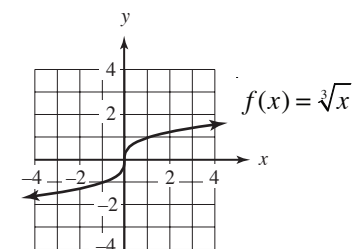
Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

Reciprocal Function

$f(x) = \dfrac{1}{x}$
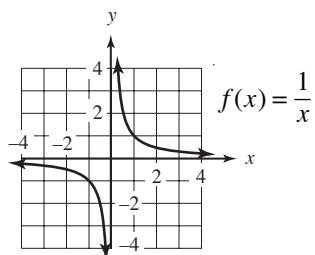
Domain: $(-\infty, 0) \cup (0, \infty)$

Range: $(-\infty, 0) \cup (0, \infty)$
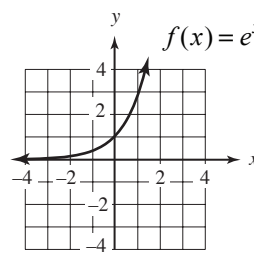
Rational Function

$f(x) = \dfrac{1}{x^2}$
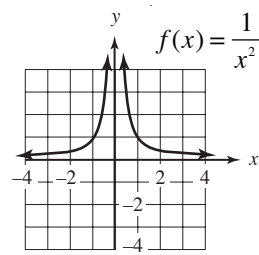
Domain: $(-\infty, 0) \cup (0, \infty)$

Range: $(0, \infty)$
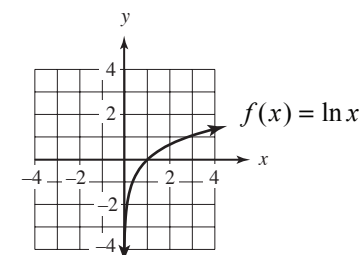
Exponential Function

$f(x) = e^x$

Domain: $(-\infty, \infty)$

Range: $(0, \infty)$
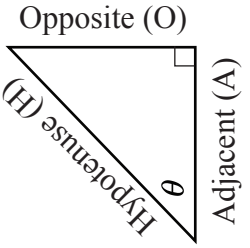
Logarithm Function

$f(x) = \ln x$

Domain: $(0, \infty)$

Range: $(-\infty, \infty)$

Essential Trigonometry for Calculus

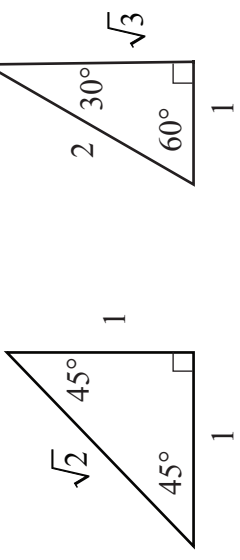## Right Triangle Trigonometry
(SOA–CAH–TOA)

$$\sin\theta = \frac{O}{H}$$

$$\cos\theta = \frac{A}{H}$$

$$\tan\theta = \frac{O}{A}$$
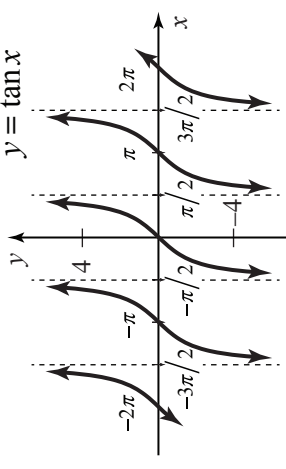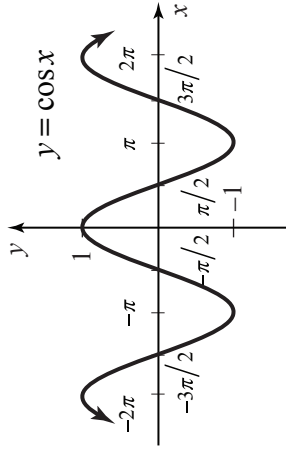
Reference Triangles

Exact Values

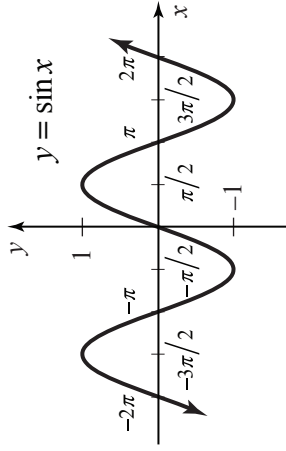| θ	30°	45°	60°
$\sin\theta$	1/2	$\sqrt{2}/2$	$\sqrt{3}/2$
$\cos\theta$	$\sqrt{3}/2$	$\sqrt{2}/2$	1/2
$\tan\theta$	$\sqrt{3}/3$	1	$\sqrt{3}$

Basic Identities

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\csc\theta = \frac{1}{\sin\theta}$$

$$\cot\theta = \frac{1}{\tan\theta} = \frac{\cos\theta}{\sin\theta}$$

$$\sec\theta = \frac{1}{\cos\theta}$$

Graphs

$y = \sin x$

$y = \cos x$

$y = \tan x$

Additional Identities

$$\sin^2\theta + \cos^2\theta = 1$$

$$\tan^2\theta + 1 = \sec^2\theta$$

$$1 + \cot^2\theta = \csc^2\theta$$

$$\sin(2\theta) = 2\sin\theta\cos\theta$$

$$\cos(2\theta) = \cos^2\theta - \sin^2\theta$$

The Unit Circle
$(\cos\theta, \sin\theta)$