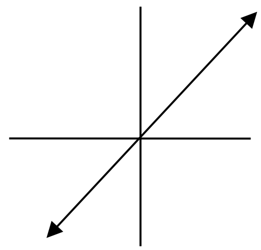
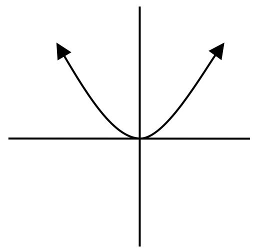
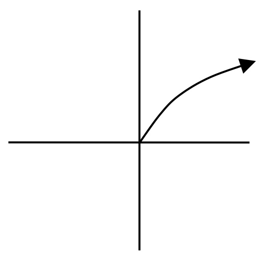
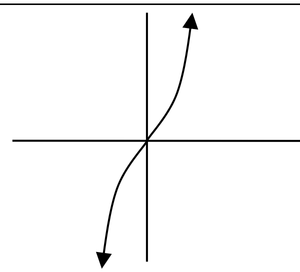
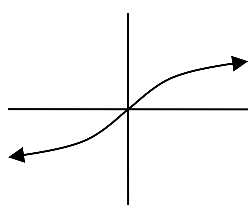
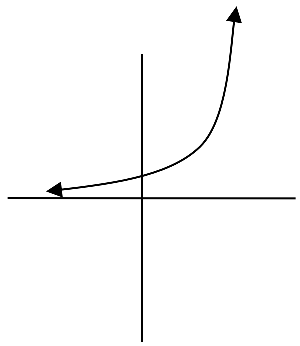
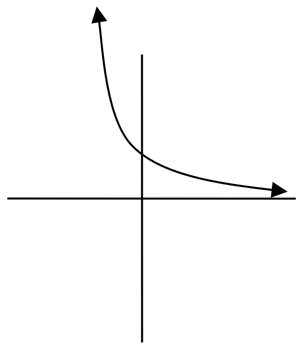
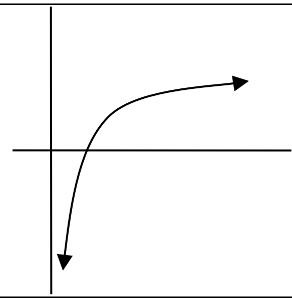
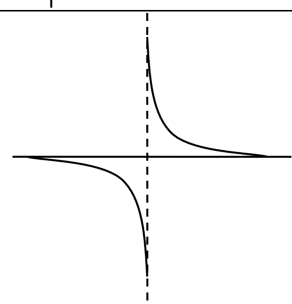
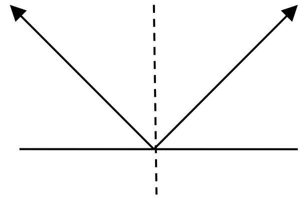
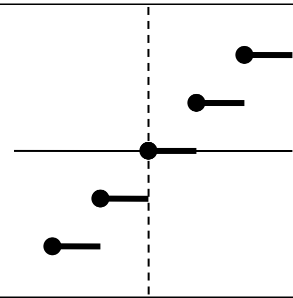
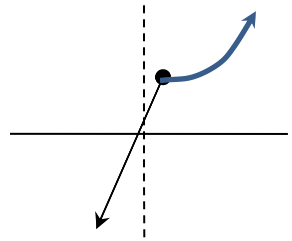
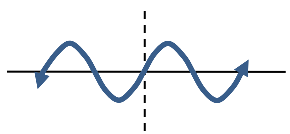
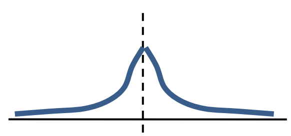
Function Name	**Reference Function**	**Graph**	**Domain/Range**	**Features**
Linear	$y = x$		D: all real numbers R: all real numbers	y = mx + b $y - y_1 = m(x - x_1)$ slope = m = $\frac{rise}{run}$ = number multiplying *x* variable
Quadratic	$y = x^2$		D: all real numbers R: all real numbers ≥ *the minimum*	x_intercepts → zeroes/solutions/roots → factors Set y = 0 to get x_intercepts. Up to 2 zeroes (also called "solutions" or "roots").
Square root	$y = \sqrt{x}$		D: all real numbers where the radicand (stuff under the square root) ≥ 0 R: all real numbers ≥ *the minimum*	"Stuff" under radical sign must be ≥ 0. This is true for all even roots (4^{th} root, 6^{th} root, etc.).
Cubic	$y = x^3$		D: all real numbers R: all real numbers	x_intercepts → zeroes/solutions/roots → factors Set y = 0 to get x_intercepts. Up to 3 zeroes (also called "solutions" or "roots").
Cube root	$y = \sqrt[3]{x}$		D: all real numbers R: all real numbers	"Stuff" under radical sign can be any real number. This is true for all odd roots (3^{rd} root, 5^{th} root, etc.).

Exponential	Growth: $y = e^x$ (or $y = 10^x$) Decay: $y = e^{-x}$ (or $y = 10^{-s}$)	 	D: all real numbers R: all real numbers *> the asymptote*	If the base is > 1 and the exponent is a positive variable, then the graph is a exponential <u>growth</u> function. Example: $y = 10^x$. If the base is < 1 and the exponent is a positive variable, then the graph is a exponential <u>decay</u> function. Example: $y = \left(\frac{1}{2}\right)^x$. If the base is > 1 and the exponent is a negative variable, then the graph is a exponential <u>decay</u> function. Example: $y = 2^{-x}$. The asymptote is the straight line y = k, where k is the value that the function gets close to as x → – ∞ (growth functions) or ∞ (decay functions). In the examples, the asymptote is y = 0.
Logarithmic	$y = \ln x$ (or $y = \log x$)		D: all real numbers *> the asymptote* R: all real numbers	The argument of the logarithm (the expression upon which the logarithm operates) ≥ 0. The asymptote is the straight line x = h, where h is the value of x for which the function gets close to– ∞. In the example, the asymptote is x = 0.
Rational	$y = \frac{1}{x}$		D: all real numbers ≠ values making denominators = 0 R: all real numbers	Values of the variable that make the denominator(s) = 0 are excluded from the domain. Those values represent *asymptotes* or *holes*. Holes occur when factors are totally canceled from the rational expression. Asymptotes occur for any factor remaining in the denominator.

Absolute Value	y = | x |		D: all real numbers R: all real numbers *> the minimum*	The "absolute value" of x gives x, if x $\geq$ 0, and –x, if x < 0. For example, if x = 2, | x | = 2. If x = –2, | x | = 2.
Step (Greatest Integer)	y = [x]		D: all real numbers R: all real numbers *> the minimum*	The "greatest integer" function. "Greatest integer" means that for any value x, pick the integer value that is ≤ x. For example, if x = 2, [x] = 2. If x = 2.9, [x] = 2.
Piecewise	$y = \begin{cases} 2x+1, & x \leq 1 \\ x^2+2, & x > 1 \end{cases}$		D: specified for each function part explicitly R: depends on the underlying functions	Piecewise functions are nothing more than two or much functions defined on different parts of the overall domain. In the example, the domain is in two parts: x $\leq$ 1 and x > 1. The function for x $\leq$ 1 is a straight line, while the function for x > 1 is a parabola.
Sinusoidal	$y = \sin t$ *or* $y = \cos t$		D: all real numbers R: $[-1,\ 1]$	The sinusoidal functions are periodic (they oscillate from value to value). Their attributes are: amplitude, period, phase (horizontal) shift, vertical shift
Standard Normal (Gaussian)	$y = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$		D: all real numbers R: $\left(0, \frac{1}{\sigma\sqrt{2\pi}}\right)$	The standard normal curve represents the relative likelihood of values normally distributed about a mean μ with standard deviation σ.