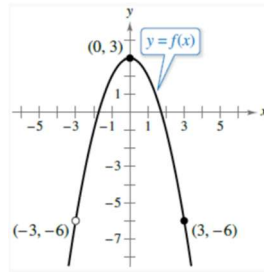
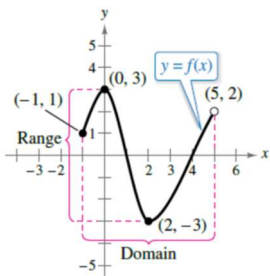


Functions and Their Graphs

- x = directed distance from the y -axis
- $f(x) = y$ = directed distance from the x -axis
- Domain –
- Range –



- x – intercepts:
- y – intercepts:
- *Standard Form of a Polynomial Function*
 - $P(x) = a_n x^n + a_{n-1} x^{n-1} + \dots + a_1 x + a_0$
 - Notice: State in Decreasing order of power
- Classifications of Polynomials

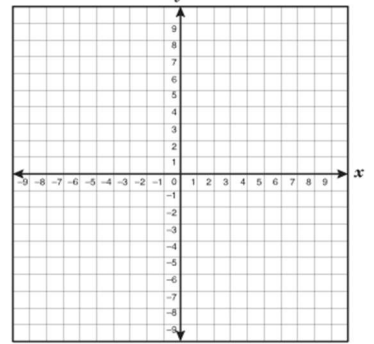
Degree	Name if Using Degree		Number of Terms	Name if Using Terms
0	Constant		1 $(5, 4x^2, \text{etc.})$	Monomial
1	Linear		2 $(x + 1, 2x^4 + 5x^2, \text{etc.})$	Binomial
2	Quadratic		3 $(3x^2 + 2x - 5, \text{etc.})$	Trinomial
3	Cubic		4 $(-3x^5 - 2x^4 + x^2 + 5x)$	Polynomial of 4 terms
4	Quartic			
5	Quintic			

- Graph features of Polynomials: Continuous, Smooth, Rounded turns
- General thoughts to aid when graphing polynomials: LEFT-HAND and RIGHT-HAND BEHAVIOR
 - If n is even, and
 - a is positive – Graph is up and up
 - a is negative – Graph is down and down
 - If n is odd, and
 - a is positive – Graph is down and up
 - a is negative – Graph is up and down

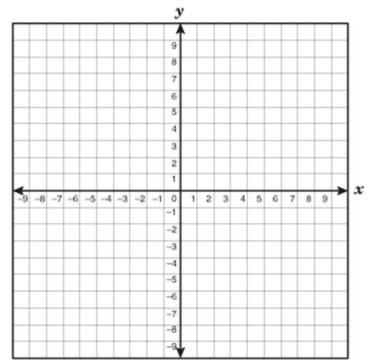
- Consider the leading term of $y = 3x^4 - 2x^3 + x - 1$. What is the end behavior of the graph?
- Zero's of a Function – Where the function equals zero ($f(x) = 0$). Graphically, x -intercepts. **Zero's** are the same as **roots**, are the same as **solutions**, are the same as **x – intercepts**.
- Find the zero's of the following functions.
 - $f(x) = 2x^2 + 13x - 14$
 - $g(t) = \sqrt{t - 25}$
 - $f(x) = \frac{x^2 - 2}{x - 1}$
- Increasing and Decreasing Behavior of Functions
 - Graph $x^3 + 3x^2 - 1$, then determine the open intervals that the function is increasing, decreasing, or constant.
- Relative Minimum and Maximums of Functions
 - Use a graphing utility to determine the relative maximum of $f(x) = -4x^2 - 7x + 3$.

- **Parent functions basics**

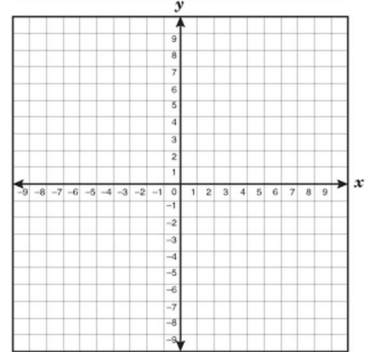
- EX: Write the linear function f for which $f(-2) = 6$ and $f(4) = -9$, and then graph and describe.



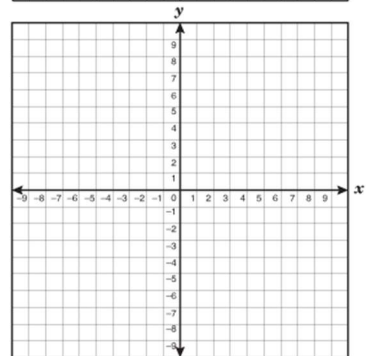
- EX: Graph and describe: $f(x) = y = x^2$

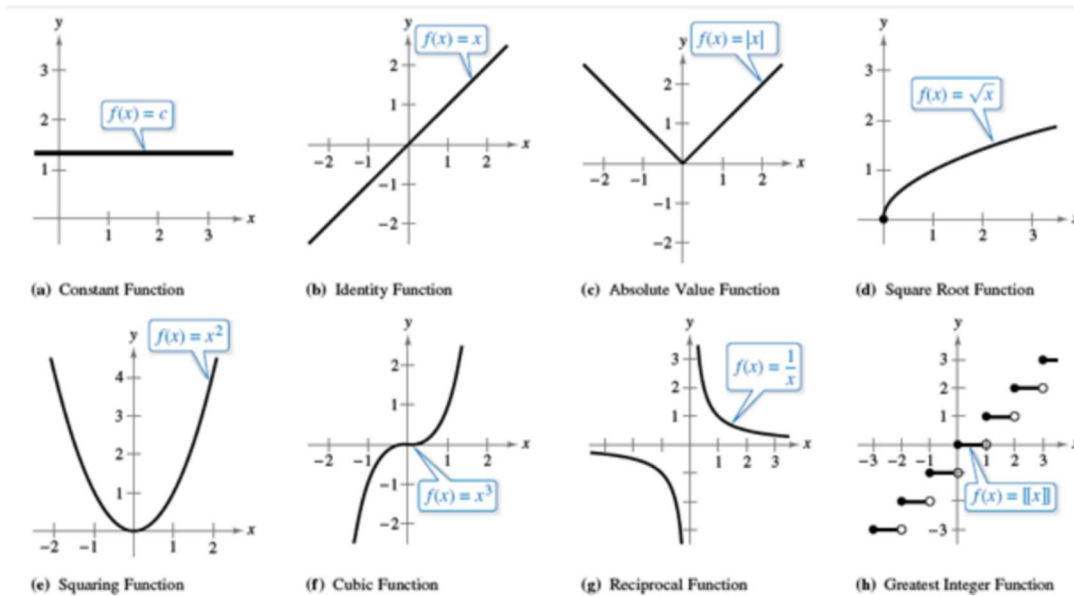


- EX: Graph and describe: $f(x) = x^3$



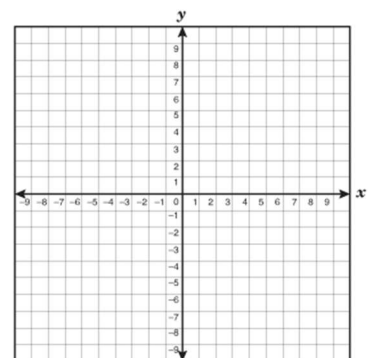
- EX: Graph and describe: $f(x) = \frac{1}{x}$





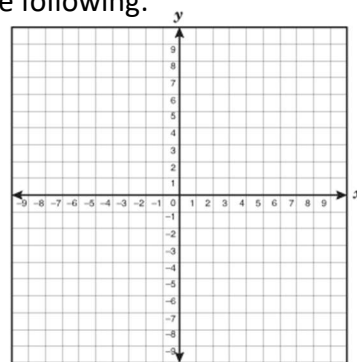
- Transformations of the parent functions
 - Vertex format of Quadratic (can be altered to suit *any* functions) $y = a(x - h)^2 + k$
 - Increasing a , narrows graph; Decreasing a , widens graph
 - a positive = up; a negative = down
 - h shifts graph left and right
 - k shifts graph up and down
 - $-a$ reflection on x - axis
- EX: Use the parent function $f(x) = x^3$ to describe the transformation in the following:
 - $f(x) = x^3 + 5$
 - $h(x) = -(x - 2)^3 - 1$

- Describe the transformation of $f(x) = \sqrt{x + 1}$ and graph.



- EX: Use the parent function $f(x) = |x|$ to describe the transformation in the following:

- $f(x) = \frac{1}{2}|x|$



- $h(x) = 2|x - 1| + 2$

