Study Prep

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TOPIC: QUADRATIC FUNCTIONS
Properties of a Parabola

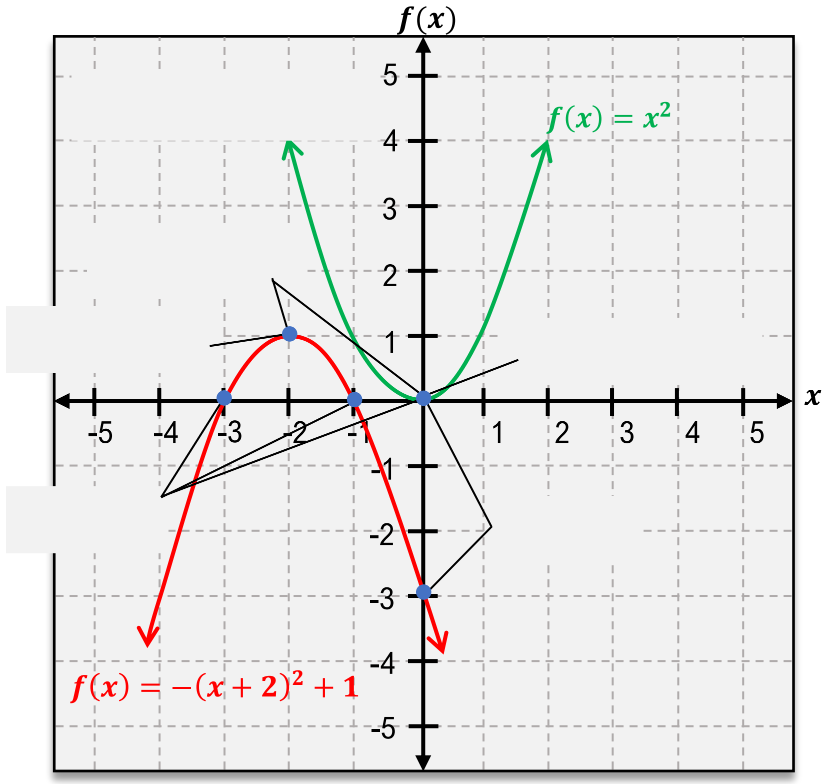
● A **quadratic function** is a polynomial of degree ___ in the **standard form**: $f(x) = ax^2 + bx + c$

$f(x) = x^2$	$f(x) = 2x^2 + 3x - 7$	$f(x) = \frac{2}{3}x^2 + 1$

- $\boldsymbol{a, b, c}$ can be any real number as long as $a \neq$____.
- Recall: The square function is a _______________, as ***all*** quadratic functions will be.

$f(x) = x^2$
Vertex: _______ [MIN|MAX]
x-intercept(s): ___________
y-intercept: _________
Axis of Symmetry: ________
Domain: *always* _________
Range when [MIN], __________: _________

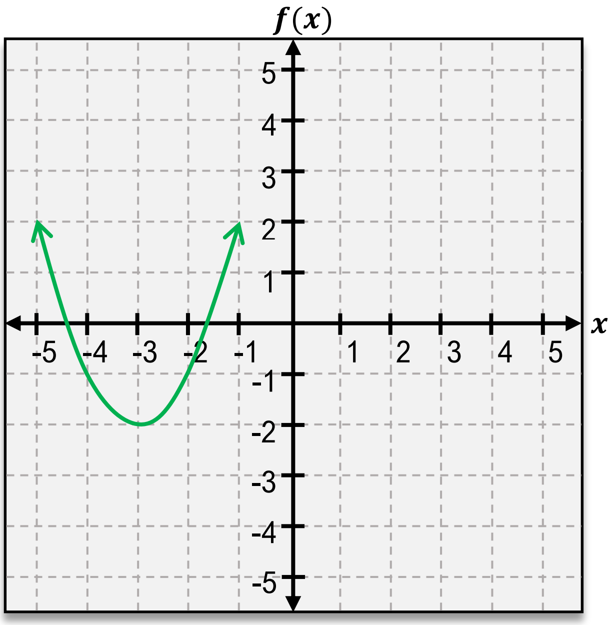
$f(x) = -(x+2)^2 + 1$
Vertex: _______ [MIN|MAX]
x-intercept(s): ___________
y-intercept: _________
Axis of Symmetry: ________
Domain: _______
Range when [MAX], __________: _________
Increasing? ___________
Decreasing? ___________



● Quadratic functions are commonly written in **vertex form**, which will help us graph with ease.

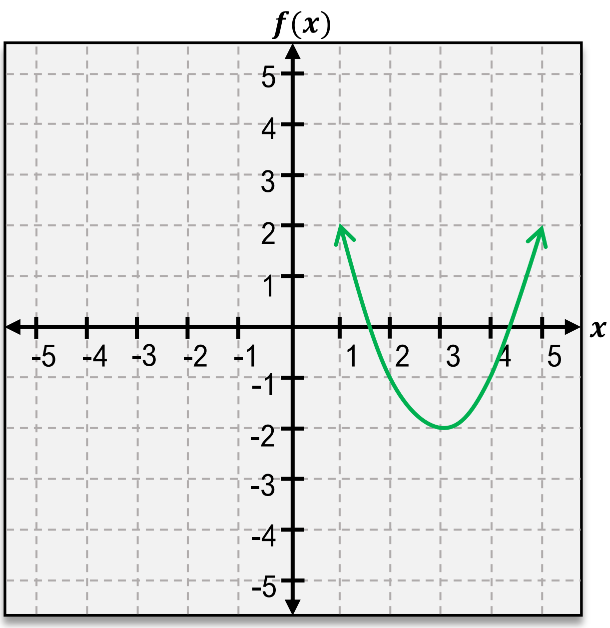
TOPIC: QUADRATIC FUNCTIONS

PRACTICE**:** Identify the ordered pair of the vertex of the parabola. State whether it is a minimum or maximum.



Vertex: ________ [MIN|MAX]

PRACTICE**:** Where is the axis of symmetry located on the given parabola?



Axis of Symmetry: ________

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TOPIC: QUADRATIC FUNCTIONS
Vertex Form & Transformations

● Vertex form of a quadratic function is based on **transforming** the square function, $\boldsymbol{f(x) = x^2}$.

$$\boldsymbol{f(x) = a(x-h)^2 + k}$$

_____________ shift by ___ units

_____________ shift by ___ units

sign
$+a$ opens _____
$-a$ opens ________

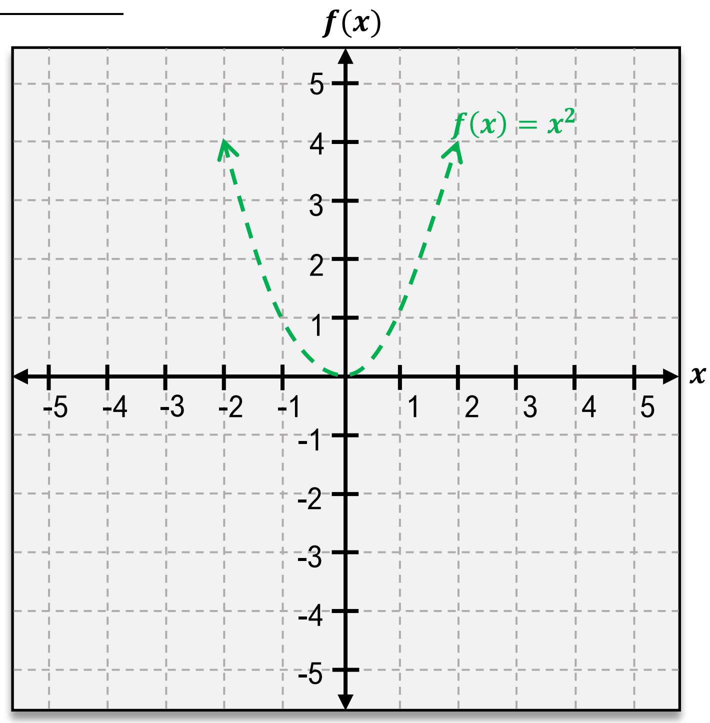
value
$|a| > 1$ vertical __________
$|a| < 1$ vertical __________

$\boldsymbol{f(x) = (x-1)^2 - 4}$
1) Vertex (______): ________ [MIN|MAX]
2) Axis of Symmetry ($x =$ ___): _________
3) x-int(s)→ Solve $f(x) = 0$: ___________
4) y-int→ Compute $f(0)$: __________
5) _____ & connect with ______________

TO GRAPH

3) $(x-1)^2 - 4 = 0$

4) $f(0) = (0-1)^2 - 4$



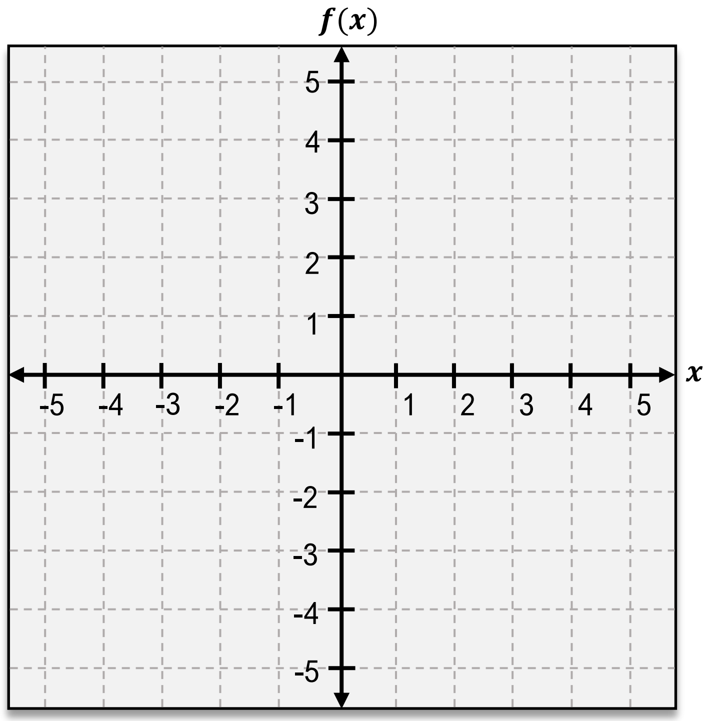
Recall:

	FACTORING	SQ. ROOT PROPERTY	COMPLETE THE SQUARE	QUADRATIC FORMULA
USE IF	● Has obvious factors **OR** ● $c = 0$	● $(x + \#)^2 = [\textbf{constant}]$ **OR** ● $b = 0$	● Leading coeff. is 1 **AND** ● b is even	● Can't easily factor ● Unsure what method to use

TOPIC: QUADRATIC FUNCTIONS

EXAMPLE**:** Graph the given quadratic function. Identify the vertex, axis of symmetry, intercepts, domain, range, and intervals for which the function is increasing or decreasing.

	$f(x) = -\frac{1}{2}(x+1)^2 + 2$
TO GRAPH	**1)** Vertex (h, k): _______ [MIN|MAX]
	2) Axis of Symmetry $(x = h)$: ________
	3) x-int(s)→ Solve $f(x) = 0$: __________
	4) y-int→ Compute $f(0)$: _________
	5) Plot & connect with smooth curve
FROM GRAPH	Domain: __________
	Range: ___________
	Increasing? ___________
	Decreasing? ___________



3) $f(x) = 0$

4) $f(0) =$

TOPIC: QUADRATIC FUNCTIONS

PRACTICE**:** Graph the given quadratic function. Identify the vertex, axis of symmetry, intercepts, domain, range, and intervals for which the function is increasing or decreasing.

$\boldsymbol{f(x) = -(x-5)^2 + 1}$

TO GRAPH

1) Vertex (h, k): ________ [MIN|MAX]

2) Axis of Symmetry $(x = h)$: _________

3) x-int(s)→ Solve $f(x) = 0$: ___________

4) y-int→ Compute $f(0)$: __________

5) Plot & connect with smooth curve

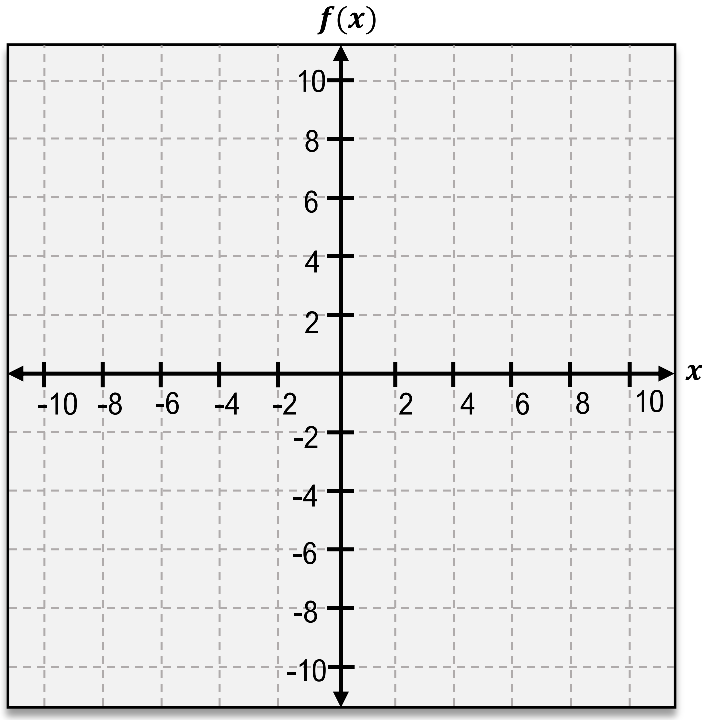
FROM GRAPH

Domain: ___________

Range: ____________

Increasing? ____________

Decreasing? ____________



3) $f(x) = 0$

4) $f(0) =$

TOPIC: QUADRATIC FUNCTIONS

Standard Form → Vertex Form

- When given a quadratic function in **standard form**, put it in **vertex form** by *completing the square*, then graph.

$f(x) = x^2 + 6x + 7$ Standard Form

Rewrite

$f(x) = (x^2 + 6x + \_\_\_) + 7 - \_\_\_\_$

Complete the Square

$f(x) = (x - h)^2 + k$ Vertex Form

$f(x) = (x + 3)^2 - 2$ Vertex Form

- Since we are working with a *function*, not an *equation*, our steps change slightly.

EXAMPLE: Put the standard form quadratic function in vertex form by completing the square.

$$f(x) = \quad x^2 + 6x \qquad\qquad + 7$$

$$f(x) = (x + \_\_\_)^2$$

COMPLETE THE SQUARE

1) Factor a out of 1st 2 terms→ $a(x^2 + \frac{b}{a}x) + c$

2) Add & ________ $\left(\frac{b}{2\_\_}\right)^2$ ________

Move **(**subtraction × $\boldsymbol{a}$**)** _________

3) Factor to $\left(x + \frac{b}{2\_\_}\right)^2$ & simplify

4) Graph from _________ form

TOPIC: QUADRATIC FUNCTIONS

EXAMPLE**:** Graph the given quadratic function. Identify the vertex, axis of symmetry, intercepts, domain, range, and intervals for which the function is increasing or decreasing.

$$f(x) = -2x^2 - 4x + 6$$

COMPLETE THE SQUARE

1) Factor a out of 1st 2 terms→ $a(x^2 + \frac{b}{a}x) + c$

2) Add & subtract $\left(\frac{b}{2a}\right)^2$ *inside*

Move **(**subtraction × $\boldsymbol{a}$**)** *outside*

3) Factor to $\left(x + \frac{b}{2a}\right)^2$ & simplify

4) Graph from vertex form

____

TO GRAPH

1) Vertex (h, k): ________ [MIN|MAX]

2) Axis of Symmetry $(x = h)$: _________

3) x-int(s)→ Solve $f(x) = 0$: ___________

4) y-int→ Compute $f(0)$: __________

5) Plot & connect with smooth curve

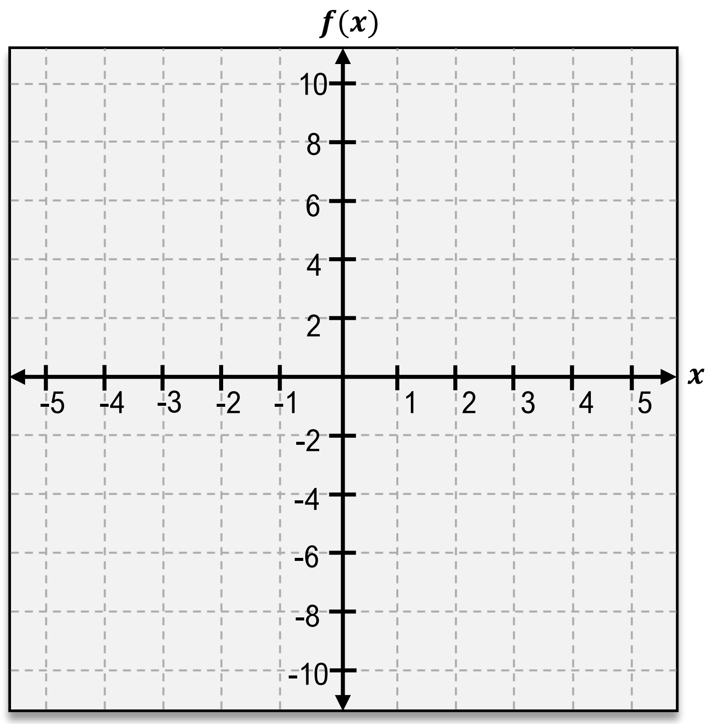
FROM GRAPH

Domain: ___________

Range: ____________

Increasing? ____________

Decreasing? ____________



3) $f(x) = 0$

4) $f(0) =$

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TOPIC: QUADRATIC FUNCTIONS

PRACTICE: Graph the given quadratic function. Identify the vertex, axis of symmetry, intercepts, domain, range, and intervals for which the function is increasing or decreasing.

$$f(x) = 3x^2 + 12x$$

COMPLETE THE SQUARE
1) Factor a out of 1st 2 terms→ $a(x^2 + \frac{b}{a}x) + c$
2) Add & subtract $\left(\frac{b}{2a}\right)^2$ *inside*
Move **(**subtraction × $\boldsymbol{a}$**)** *outside*
3) Factor to $\left(x + \frac{b}{2a}\right)^2$ & simplify
4) Graph from vertex form

____

TO GRAPH

1) Vertex (h, k): ________ [MIN|MAX]

2) Axis of Symmetry $(x = h)$: _________

3) x-int(s)→ Solve $f(x) = 0$: ___________

4) y-int→ Compute $f(0)$: __________

5) Plot & connect with smooth curve

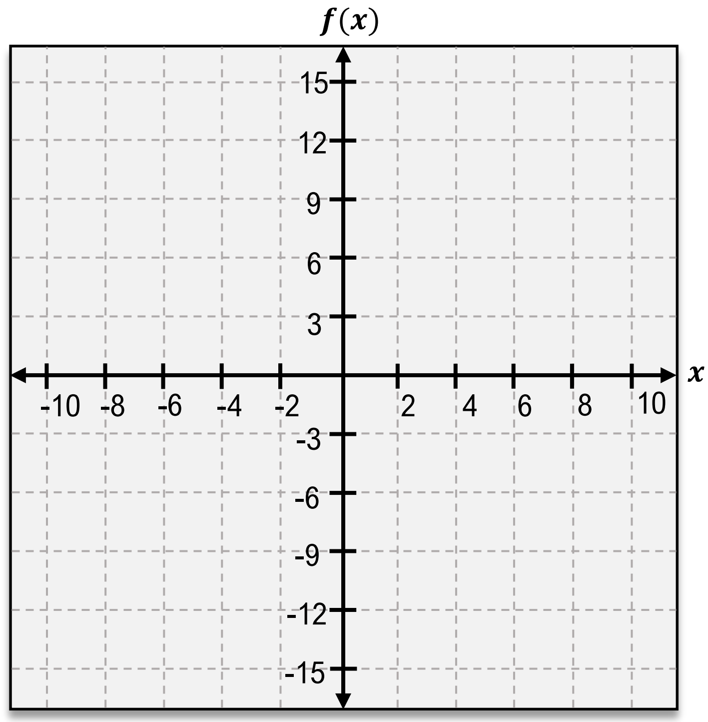
FROM GRAPH

Domain: ___________

Range: ____________

Increasing? ____________

Decreasing? ____________



3) $f(x) = 0$

4) $f(0) =$

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TOPIC: UNDERSTANDING POLYNOMIAL FUNCTIONS

Intro to Polynomial Functions

- You will need to know how recognize polynomial functions & their graphs.
  - Recall: Polynomials have *only* positive whole number exponents (*no negatives, no fractions*)
  - Standard form: Like terms combined & in descending order of power $\boxed{f(x) = a_n x^n + a_{n-1}x^{n-1} + \cdots + a_1 x + a_0}$

Degree n (highest exponent)

$$\boxed{\_\_\_\_\_ = 6x^3 + 3x^2 + 5x + 4}$$

Leading Coefficient   Coefficients   Constant

EXAMPLE: Determine if each function is a polynomial function. If so, put in standard form. State degree & leading coeff.

(A) $f(x) = -x^2 + 5x^3 - 6x + 4$

Polynomial function? ☐
Degree: _______
Leading Coefficient: _______

(B) $f(x) = 2x^{\frac{1}{2}} + 3$

Polynomial function? ☐
Degree: _______
Leading Coefficient: _______

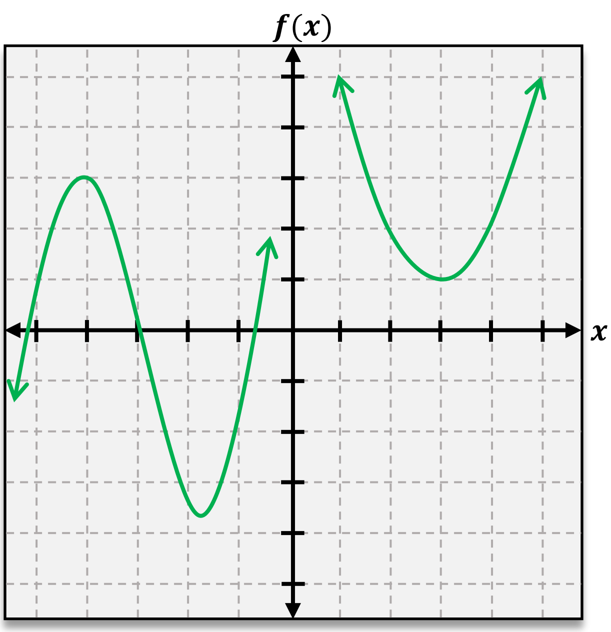
(C) $f(x) = -\frac{2}{3}x^4 + 1 + 3$

Polynomial function? ☐
Degree: _______
Leading Coefficient: _______

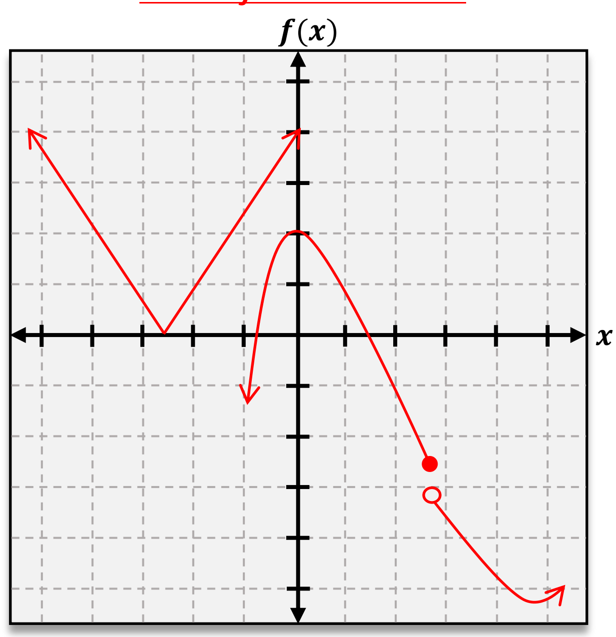
Graphs of Polynomial Functions

- Graphs of polynomial functions are _____________ and _________________ (*no corners, no breaks*)

Polynomial Functions



NOT Polynomial Functions



  - Domain: *always* ___________

TOPIC: UNDERSTANDING POLYNOMIAL FUNCTIONS

PRACTICE: Determine if the given function is a polynomial function. If so, write in standard form, then state the degree and leading coefficient.

$$f(x) = 4x^3 + \frac{1}{2}x^{-1} - 2x + 1$$

Polynomial function? ☐
Degree: _______
Leading Coefficient: _______

PRACTICE: Determine if the given function is a polynomial function. If so, write in standard form, then state the degree and leading coefficient.

$$f(x) = 2 + x$$

Polynomial function? ☐
Degree: _______
Leading Coefficient: _______

PRACTICE: Determine if the given function is a polynomial function. If so, write in standard form, then state the degree and leading coefficient.

$$f(x) = 3x^2 + 5x + 2$$

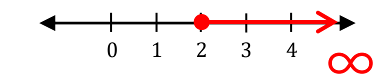
Polynomial function? ☐
Degree: _______
Leading Coefficient: _______

TOPIC: UNDERSTANDING POLYNOMIAL FUNCTIONS
End Behavior

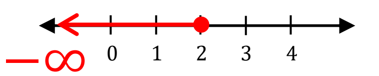
- Just as the graph of an inequality may go to $+\infty$ **or** $-\infty$, the graph of a polynomial function will *always* do this.
  - **End Behavior:** what the graph of $f(x)$ does far to the *left* (________) and far to the *right* (________)
    "x approaches $-\infty$" "x approaches ∞"

Graphing Inequalities

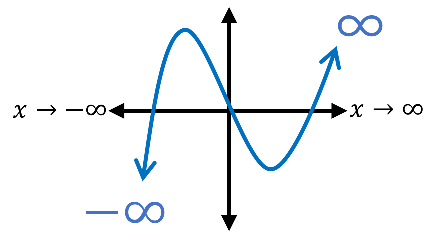
$x \geq 2$



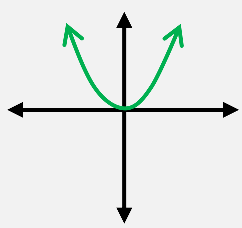
$x \leq 2$



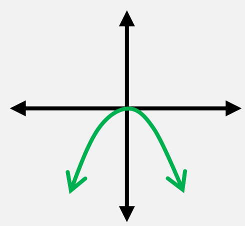
Graphing Functions



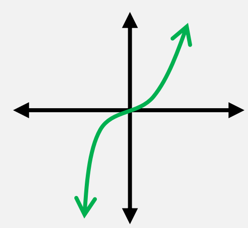
- The behavior in the *middle* of the graph will look different depending on the function.



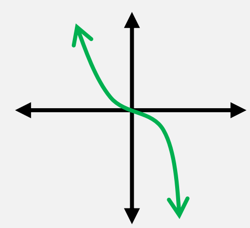
a_n is [+ | −]
n is [EVEN | ODD]



a_n is [+ | −]
n is [EVEN | ODD]



a_n is [+ | −]
n is [EVEN | ODD]



a_n is [+ | −]
n is [EVEN | ODD]

- To determine the end behavior of a polynomial, look at the __________ term in standard form.
  - If Leading Coefficient (a_n) is: **positive**: right side __________ $(f(x) \to$ _____$)$
    negative: right side __________ $(f(x) \to$ _____$)$

  Degree (n) is: **even**: ends are _______________
    odd: ends are _______________

Degree

$$3x^5 + \cdots$$

Leading Coefficient

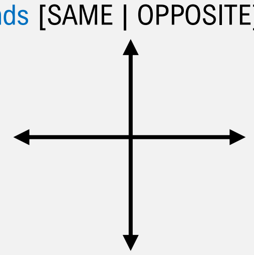
<u>EXAMPLE</u>: Determine the end behavior of each polynomial function, then sketch.

(A)

$$f(x) = -4x^6 + x^3 + 2$$

Right [RISES | FALLS]

Ends [SAME | OPPOSITE]

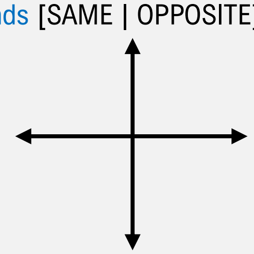


(B)

$$f(x) = 2x^3 + x$$

Right [RISES | FALLS]

Ends [SAME | OPPOSITE]



TOPIC: UNDERSTANDING POLYNOMIAL FUNCTIONS

PRACTICE: Determine the end behavior of the given polynomial function.

$f(x) = x^2 + 4x + x + 7x^3$

Right side [RISES | FALLS]

Ends are [SAME | OPPOSITE]

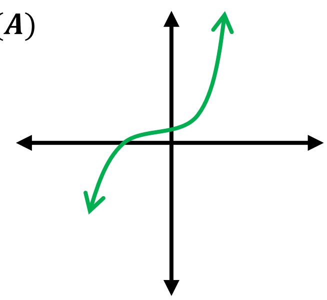
PRACTICE: Match the given polynomial function to its graph based on end behavior.

$f(x) = -2x^3 + x^2 + 1$

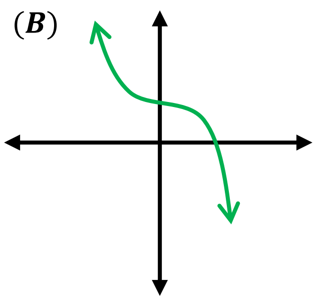
Right side [RISES | FALLS]

Ends are [SAME | OPPOSITE]

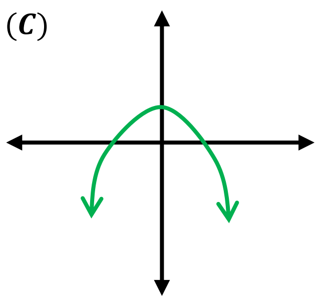
$(\boldsymbol{A})$



$(\boldsymbol{B})$



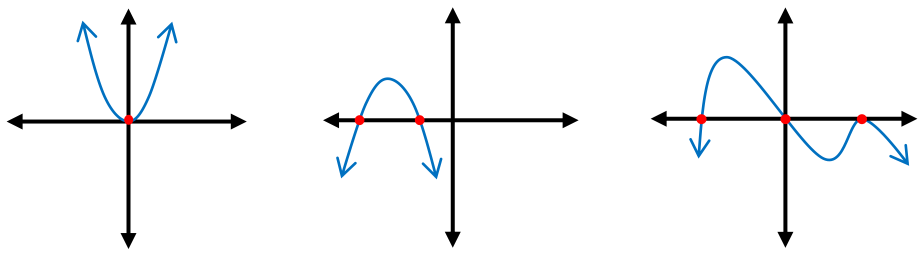
$(\boldsymbol{C})$



TOPIC: UNDERSTANDING POLYNOMIAL FUNCTIONS
Finding Zeros by Factoring & Multiplicity of Zeros

- There may be multiple **x-intercepts** of a polynomial function, called the *zeros, roots* or *solutions* of $f(x) = 0$.
  - Find zeros by factoring & setting each factor $= 0$.
  - **Multiplicity** of a zero: __________ of times a factor occurs.

$(x-1)^2$
$x - 1 = 0 \rightarrow$ $x = 1$ has multiplicity ___
$x = 1$

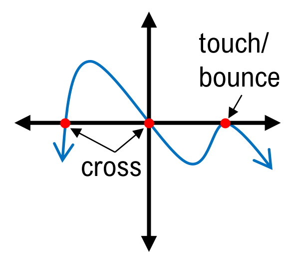


EXAMPLE: Find the zeros of the given polynomial function and give the multiplicity of each. State whether the graph crosses or touches the x-axis at each zero.

$$f(x) = 2x(x-3)^2(x+4)^3$$

$x =$ __________	$x =$ __________	$x =$ __________
Multiplicity: ____	Multiplicity: ____	Multiplicity: ____
[TOUCH | CROSS]	[TOUCH | CROSS]	[TOUCH | CROSS]

- Multiplicity determines what the graph does at that zero: If even: graph ___________ x-axis
  odd: graph ___________ x-axis



TOPIC: UNDERSTANDING POLYNOMIAL FUNCTIONS

PRACTICE: Find the zeros of the given polynomial function and give the multiplicity of each. State whether the graph crosses or touches the x-axis at each zero.

$$f(x) = 2x^4 - 12x^3 + 18x^2$$

$x =$ ________ $x =$ ________

Multiplicity: ____ Multiplicity: ____

[TOUCH | CROSS] [TOUCH | CROSS]

PRACTICE: Find the zeros of the given polynomial function and give the multiplicity of each. State whether the graph crosses or touches the x-axis at each zero.

$$f(x) = x^2\,(x-1)^3(2x+6)$$

$x =$ ________ $x =$ ________ $x =$ ________

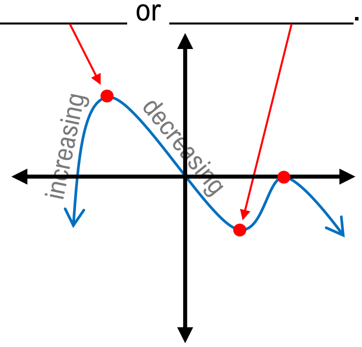
Multiplicity: ____ Multiplicity: ____ Multiplicity: ____

[TOUCH | CROSS] [TOUCH | CROSS] [TOUCH | CROSS]

TOPIC: UNDERSTANDING POLYNOMIAL FUNCTIONS
Turning Points

● Graphs of polynomial functions may have multiple **turning points**: points where the graph changes ____________.

- The *maximum* number of turning points is $n - 1$, where n is the _________ of the polynomial.
- Each turning point is either a local ___________ or _____________.



EXAMPLE: Determine the maximum number of turning points for each polynomial function.

(A)	(B)	(C)
$f(x) = 6x^4 + 2x$	$f(x) = x^2 - 1$	$f(x) = -x^2 + 5x^3 - 6x$
Max. turning points: _______	Max. turning points: _______	Max. turning points: _______

● When graphing, we'll be able to use turning points to check that we graphed correctly.

PRACTICE: Determine the maximum number of turning points for the given polynomial function.

$$f(x) = 6x^4 + 2x$$

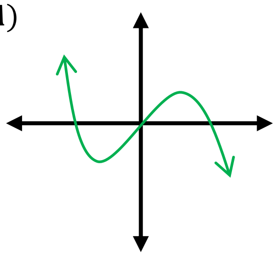
Max. turning points: _______

TOPIC: UNDERSTANDING POLYNOMIAL FUNCTIONS

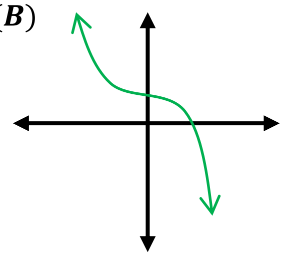
PRACTICE: Based *ONLY* on the maximum number of turning points, which of the following graphs could NOT be the graph of the given function?

$$f(x) = x^3 + 1$$

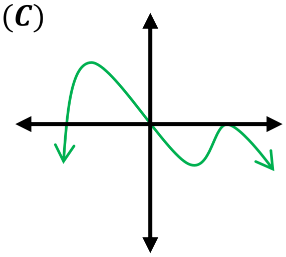
$(\boldsymbol{A})$



$(\boldsymbol{B})$



$(\boldsymbol{C})$



PRACTICE: The given term represents the leading term of some polynomial function. Determine the end behavior and the maximum number of turning points.

$4x^5$

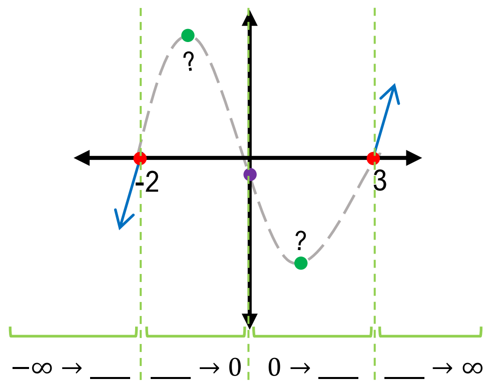
Right side [RISES | FALLS]

Ends are [SAME | OPPOSITE]

Max. turning points: ________

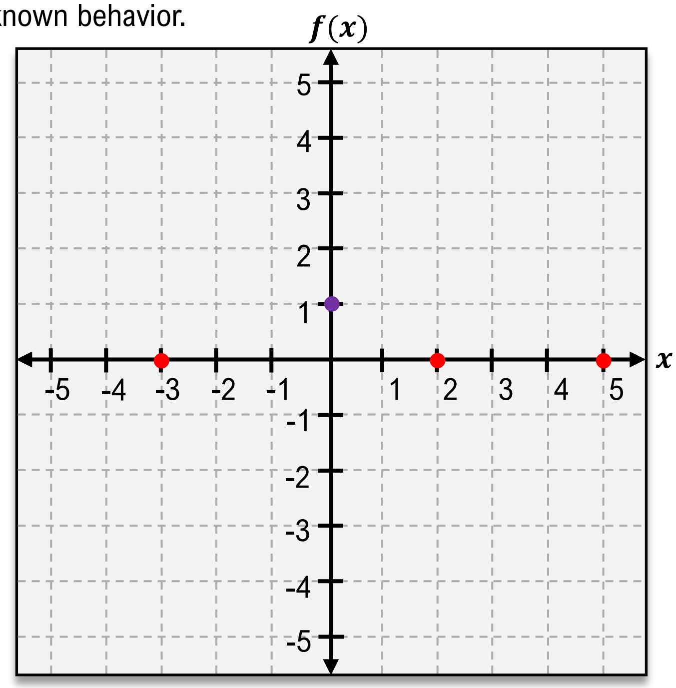
TOPIC: GRAPHING POLYNOMIAL FUNCTIONS
Intervals of Unknown Behavior

- We know how to determine **end behavior**, **x-intercepts**, **y-intercept**, and **turning points** of a polynomial function.
  - Find behavior between known points by breaking graph into __________ & plotting a _______ in each interval.



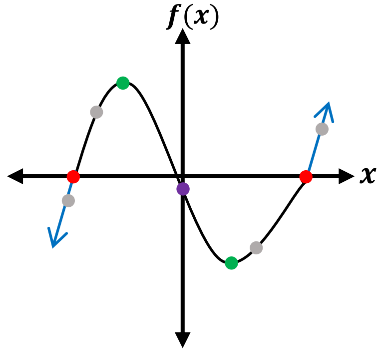
x				
$f(x)$				

PRACTICE: Based on the known points plotted on the graph, determine what intervals the graph should be broken into in order to determine unknown behavior.



TOPIC: GRAPHING POLYNOMIAL FUNCTIONS

- To graph a polynomial function, include **end behavior**, **x-intercepts**, **y-intercept**, **turning points**, & **points between**.



TO GRAPH

$$f(x) = 2x^3 - 6x^2 + 6x - 2$$

1) End Behavior ($a_n x^n$):

a_n: $+$ | $-$
Right side [RISES | FALLS]

n: EVEN | ODD
Ends are [SAME | OPPOSITE]

2) x-int(s) & behavior→ Solve $f(x) = 0$

$2(x-1)^3 = 0$ $\qquad x =$ ________

Multiplicity: ____

EVEN | ODD
[TOUCH | CROSS]

3) y-int→ Compute $f(0)$: __________

$f(0) = \mathbf{2(0-1)^3} =$

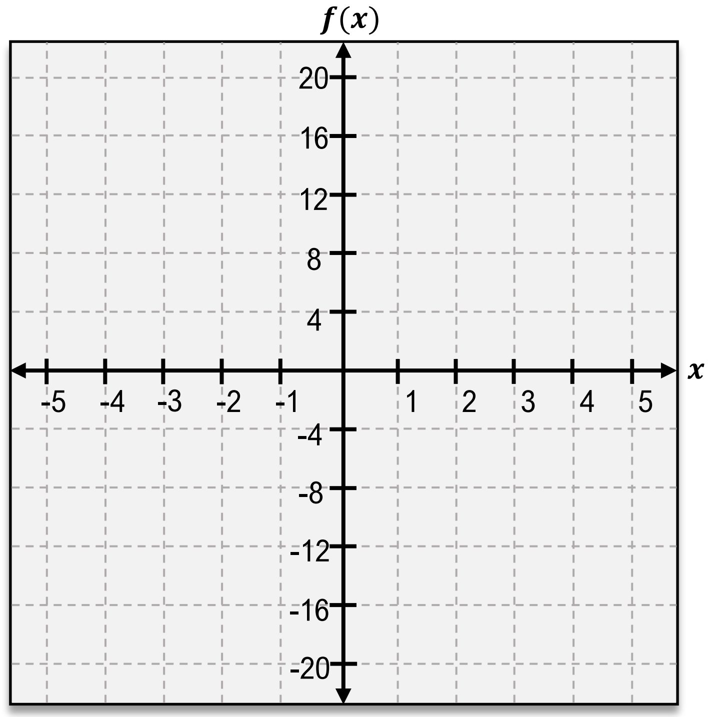
4) Determine intervals & plot a point in each

$-\infty \to$ ___ | $0 \to$ ___ | ___ $\to \infty$

x			
$f(x)$			

5) Connect with smooth, continuous curve

6) Check max. turning pts.→ $(n-1)$: ____ ☐



TOPIC: GRAPHING POLYNOMIAL FUNCTIONS

EXAMPLE: Graph the polynomial function. Determine the domain and range.

$$f(x) = 3x^3 + 12x^2 + 12x$$

TO GRAPH

1) End Behavior ($a_n x^n$):

Right side [RISES | FALLS]

Ends are [SAME | OPPOSITE]

2) x-int(s) & behavior→ Solve $f(x) = 0$

$x =$ ________ $x =$ ________

Multiplicity: ____ Multiplicity: ____

[TOUCH | CROSS] [TOUCH | CROSS]

3) y-int→ Compute $f(0)$: ________

4) Determine intervals & plot a point in each

x			
$f(x)$			

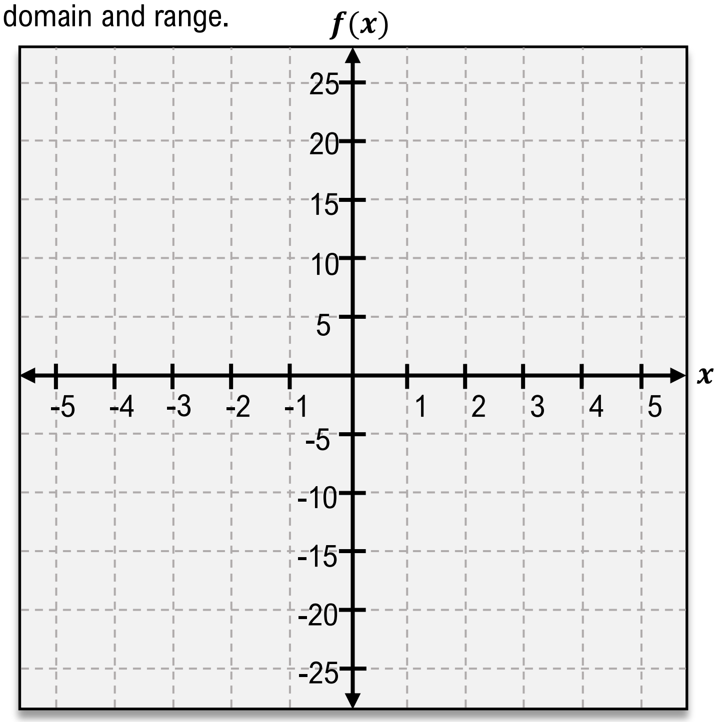
5) Connect with smooth, continuous curve

6) Check max. turning pts.→ $(n-1)$: ____ ☐

FROM GRAPH

Domain: ________

Range: ________



2) $f(x) = 0$

3) $f(0) =$

4) $f(\quad) =$

$f(\quad) =$

$f(\quad) =$

TOPIC: GRAPHING POLYNOMIAL FUNCTIONS

PRACTICE: Graph the polynomial function. Determine the domain and range.

$$f(x) = (3x+2)(x-1)^2$$

TO GRAPH

1) End Behavior ($a_n x^n$):

Right side [RISES | FALLS]

Ends are [SAME | OPPOSITE]

2) x-int(s) & behavior→ Solve $f(x) = 0$

$x =$ ________ $x =$ ________

Multiplicity: ____ Multiplicity: ____

[TOUCH | CROSS] [TOUCH | CROSS]

3) y-int→ Compute $f(0)$: ________

4) Determine intervals & plot a point in each

x				
$f(x)$				

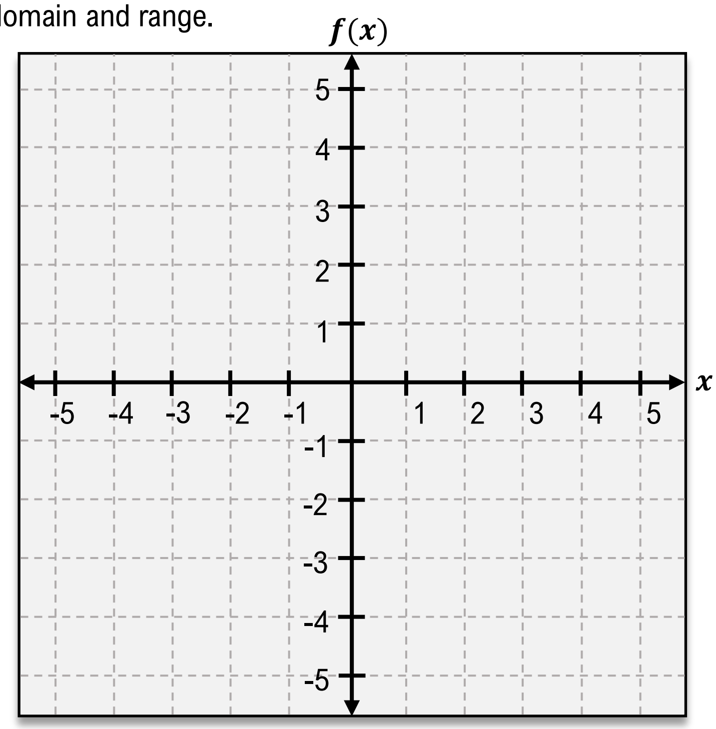
5) Connect with smooth, continuous curve

6) Check max. turning pts.→ $(n-1)$: ____ ☐

FROM GRAPH

Domain: ________

Range: ________



2) $f(x) = 0$

3) $f(0) =$

4) $f(\quad) =$

$f(\quad) =$

TOPIC: INTRODUCTION TO RATIONAL FUNCTIONS

Introduction to Rational Functions

- A **rational function** has a ______________ in the numerator & denominator: $f(x) = \frac{x^2+4x+1}{3x+2} = \frac{p(x)}{q(x)}$
  - Recall: The denominator of a fraction ***CANNOT*** be ________.

Rational ***Equation***	Rational ***Function***
$12 = \frac{1}{\underbrace{x-1}_{\neq 0}}$	$f(x) = \frac{1}{\underbrace{x-1}_{\neq 0}}$
Restriction: $x \neq$ ____	Domain: $\{x \mid x \neq$ ____$\}$

- To determine domain, set denominator = 0 & solve for x. Domain is any real #, *EXCEPT* what makes denom $= 0$.
- To write a rational function in **lowest terms**, factor top & bottom, then __________ any common factors.
  - Always find the domain *BEFORE* writing in lowest terms.

EXAMPLE: Find the domain of the rational function. Then, write the function in lowest terms.

(A)	***(B)***
$f(x) = \frac{3}{3x+12}$	$f(x) = \frac{x+5}{x^2-25}$
$\{x \mid x \neq$ ________$\}$	$\{x \mid x \neq$ ________$\}$
$f(x) = \frac{3}{3x+12}$	$f(x) = \frac{x+5}{x^2-25}$

TOPIC: INTRODUCTION TO RATIONAL FUNCTIONS

PRACTICE: Find the domain of the rational function. Then, write it in lowest terms.

$f(x) = \frac{x^2+9}{x-3}$ $\{x|x \neq$ ________$\}$

PRACTICE: Find the domain of the rational function. Then, write it in lowest terms.

$f(x) = \frac{6x^5}{2x^2-8}$ $\{x|x \neq$ ________$\}$

Study Prep
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TOPIC: GRAPHING RATIONAL FUNCTIONS

Graphing Rational Functions Using Transformations

- We can graph many rational functions by applying rules of transformations to $\frac{1}{x}$

Reflect over [x | y] axis / [x | y] axis

[Horiz. | Vert.] / [Horiz. | Vert.] **shift**

$$g(x) = -f(-x-h)+k$$

(*Transformations*)

$g(x) = \frac{1}{x-3} + 1$

TO GRAPH

1) Plot VA at x = ____: x = _____

2) Plot HA at y = ____: y = _____

3) a. Reflect? □ → (1,1) (−1, −1) over [x | y]

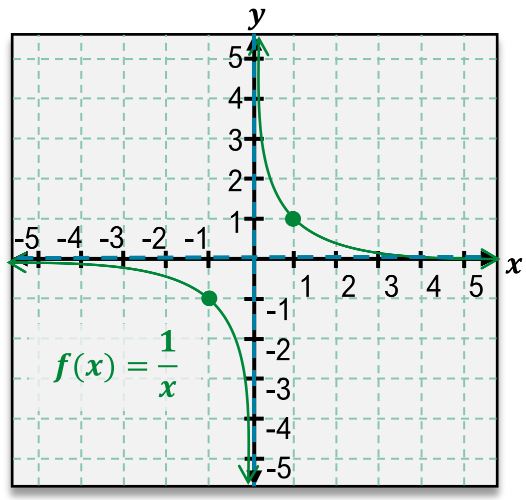
b. Shift test points by (____, ____)

4) Sketch curves approaching asymptotes

FROM GRAPH

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

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



EXAMPLE: Graph the given function as a transformation of $f(x) = \frac{1}{x^2}$

$g(x) = -\frac{1}{(x-2)^2}$

TO GRAPH

1) Plot VA at $x = h$: x = _____

2) Plot HA at $y = k$: y = _____

3) a. Reflect? □ → (1,1) (−1,1) over [x | y]

b. Shift test points by (____, ____)

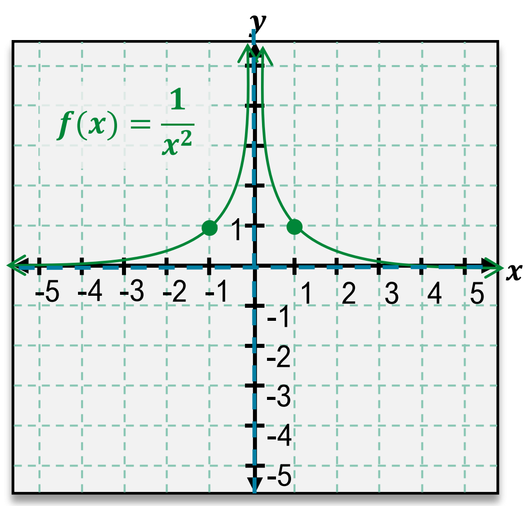
4) Sketch curves approaching asymptotes

FROM GRAPH

Domain: $(-\infty$, ____) ∪ (____, $\infty)$
h h

Range: If upper quadrants: (k, ∞)

If lower quadrants: $(-\infty$, ____)
k



TOPIC: GRAPHING RATIONAL FUNCTIONS

PRACTICE: Graph the rational functions using transformations.

(A)

$$g(x) = -\frac{1}{x} + 3$$

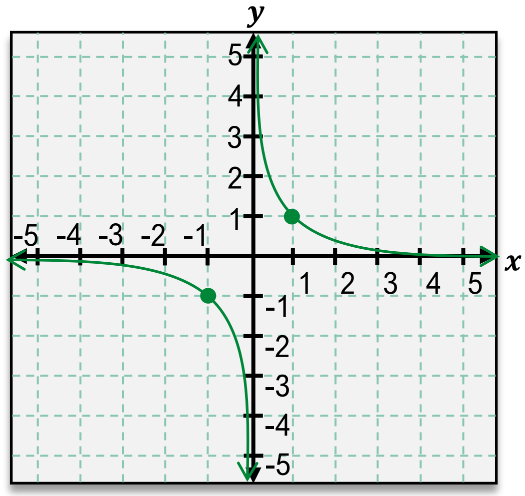
TO GRAPH

1) Plot VA at $x = h$: $x =$ _____
2) Plot HA at $y = k$: $y =$ _____
3) a. Reflect? □ → $(1,1)$ $(-1,-1)$ over $[x \mid y]$
   b. Shift test points by (____,____)
4) Sketch curves approaching asymptotes

FROM GRAPH

Domain: (____ , ____) ∪ (____ , ____)

Range: (____ , ____) ∪ (____ , ____)



PRACTICE: Graph the rational functions using transformations.

(B)

$$g(x) = \frac{1}{(x+3)^2} - 2$$

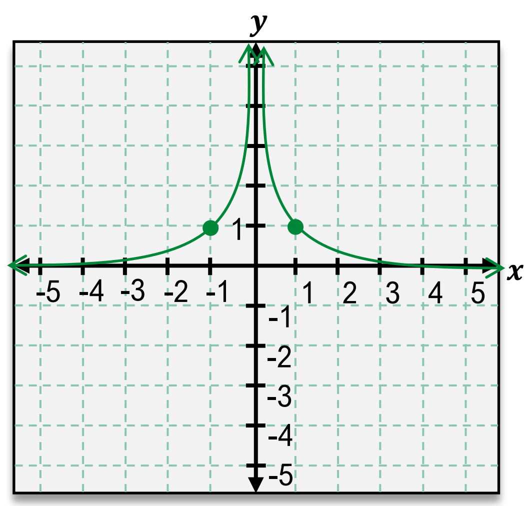
TO GRAPH

1) Plot VA at $x = h$: $x =$ _____
2) Plot HA at $y = k$: $y =$ _____
3) a. Reflect? □ → $(1,1)$ $(-1,1)$ over $[x \mid y]$
   b. Shift test points by (____,____)
4) Sketch curves approaching asymptotes

FROM GRAPH

Domain: (____ , ____) ∪ (____ , ____)

Range: (____ , ____)



TOPIC: GRAPHING RATIONAL FUNCTIONS

How to Graph Rational Functions

- To graph a rational function, determine **vertical & horizontal asymptotes**, **x** & **y-intercepts**, and **holes**.

$$f(x) = \frac{2x-3}{x-1}$$

TO GRAPH

1) Factor & find Domain → Set Denom. = 0

$x - 1 = 0$ $\{x \mid x \neq \_\_\_\_\_\_\_\_\}$

2) Holes → a. Set Common Factor(s) = 0:____

b. Put in Lowest Terms

3) x-int(s) & behavior→ Set Num. $= 0$
(to solve $f(x) = 0$)

$2x - 3 = 0$ $x = \_\_\_\_\_\_\_\_$

Multiplicity: ____

EVEN ODD
[TOUCH | CROSS]

4) y-int → Compute $f(0)$: ________

$$f(0) = \frac{2(0)-3}{0-1} =$$

5) Vertical Asymptote(s) → Set Denom. = 0

$x - 1 = 0$ $x = \_\_\_\_\_\_$

6) Horizontal/Slant Asymptote(s) $\frac{2x-3}{x-1}$

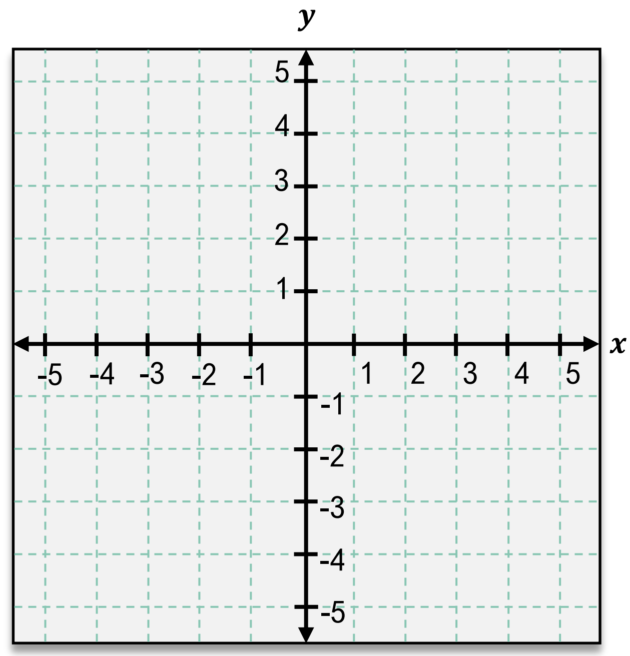
Deg. Num. [< | =] Deg. Denom

$y =$ [0 | divide lead coeff] → _____

7) Determine intervals & plot a point in each

x			
$f(x)$			

8) Connect & draw approaching asymptotes



- Recall: Find behavior *between* known components by breaking graph into __________.
  - Use vertical asymptote(s) & x-intercept(s) to form intervals.

Study Prep
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TOPIC: GRAPHING RATIONAL FUNCTIONS

EXAMPLE: Graph the rational function.

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

TO GRAPH

1) Factor & find Domain → Set Denom. = 0

$\{x | x \neq$ ________$\}$

2) Holes → a. Set Common Factor(s) = 0:____

b. Put in Lowest Terms

3) x-int(s) & behavior→ Set Num. $= 0$

$x =$ __________

Multiplicity: ____

EVEN ODD
[TOUCH | CROSS]

4) y-int → Compute $f(0)$: _________

5) Vertical Asymptote(s) → Set Denom. = 0

$x =$ _______

6) Horizontal/Slant Asymptote(s)

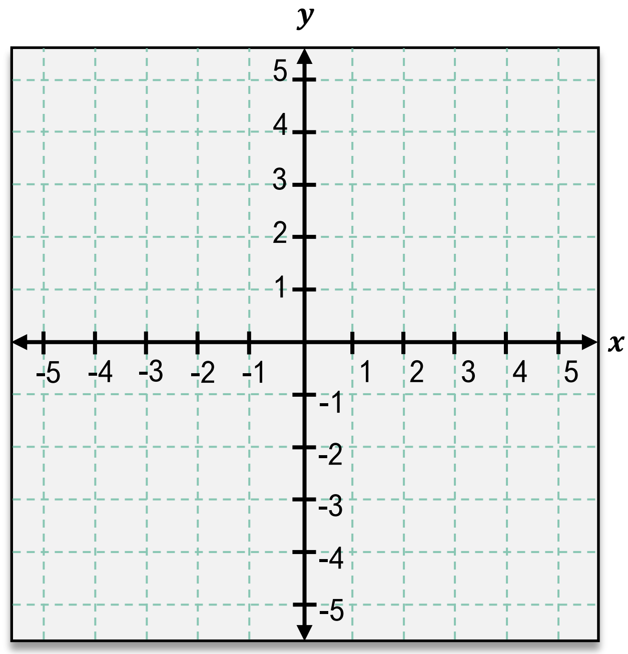
Deg. Num. [$<$ | $=$] Deg. Denom

$y =$ [0 | divide lead coeff] → _____

7) Determine intervals & plot a point in each

x				
$f(x)$				

8) Connect & draw approaching asymptotes



TOPIC: GRAPHING RATIONAL FUNCTIONS

PRACTICE: Graph the rational function.

$$f(x) = \frac{x+3}{x^2+5x+6}$$

TO GRAPH

1) Factor & find Domain → Set Denom. = 0

$\{x | x \neq$ ________$\}$

2) Holes → a. Set Common Factor(s) = 0:____

b. Put in Lowest Terms

3) x-int(s) & behavior→ Set Num. $= 0$

$x =$ ________

Multiplicity: ____

EVEN ODD
[TOUCH | CROSS]

4) y-int → Compute $f(0)$: ________

5) Vertical Asymptote(s) → Set Denom. = 0

$x =$ ________

6) Horizontal/Slant Asymptote(s)

Deg. Num. [< | =] Deg. Denom

$y =$ [0 | divide lead coeff] → _____

7) Determine intervals & plot a point in each

x			
$f(x)$			

8) Connect & draw approaching asymptotes