Lecture 10

Slope, Rate of change, Horiz/Vert Lines, Slope-Int, Pt-Slope, Parallel/Perpendicular

1.
Find the slope bewteen the points $(-4,-3)$ and $(1,3)$. Express your answer as an integer or reduced fraction.

2.
Find the slope between the points $\left(\frac{2}{11},\frac{10}{7}\right)$ and $\left(\frac{13}{11},\frac{13}{7}\right)$

3.
Find the slope between the points $(6,1)$ and $(9,1)$. Answer DNE if the slope between the points is undefined.

4.
Find the slope between the points $(-10,5)$ and $(-10,8)$. Answer DNE if the slope between the points is undefined.

5.
Give two points with integer coordinates that have a slope of $\frac{3}{5}$ between them.

First point: (_____ , _____)

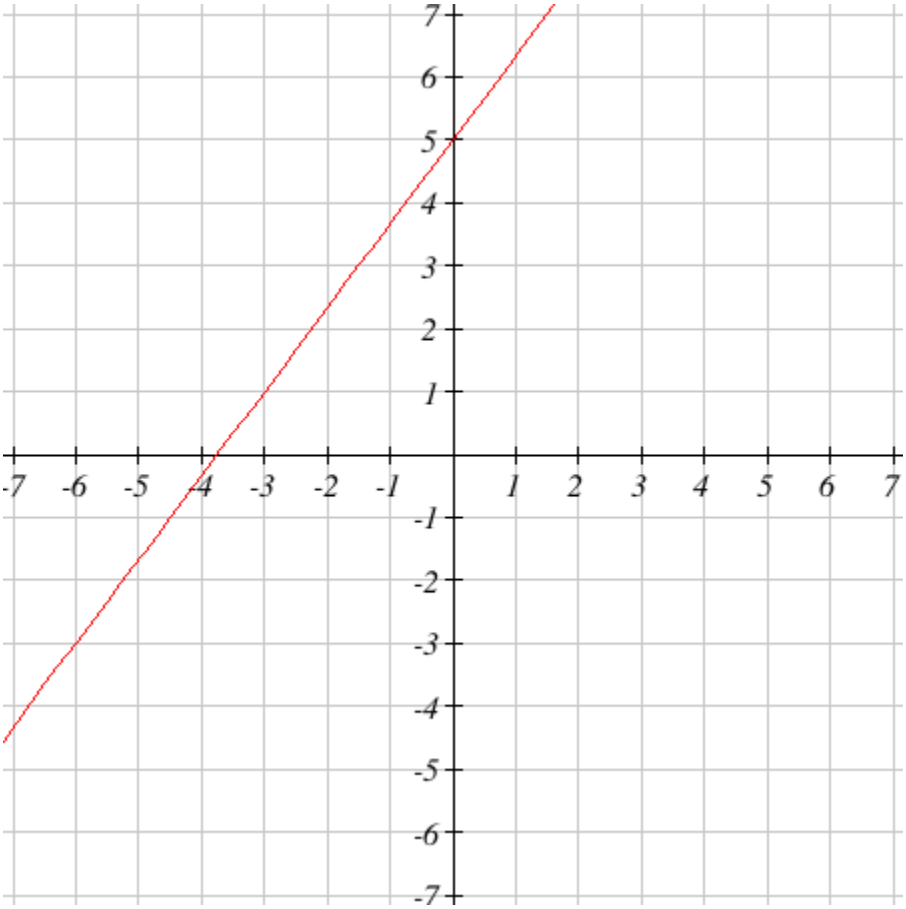
Second point: (_____,_____)

6.
Is the point $(18,-77)$ on the graph of the function $f(x)=-4x-5$?

- Yes
- No
- It is impossible to determine

7.

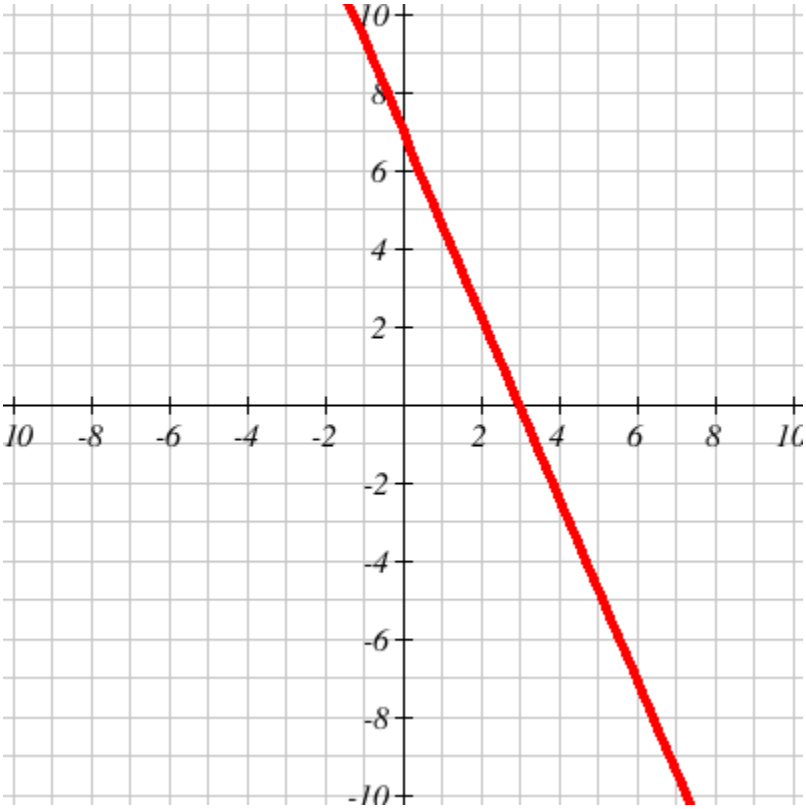
Find the slope of the line graphed below. Give your answer as an integer or as a reduced fraction.



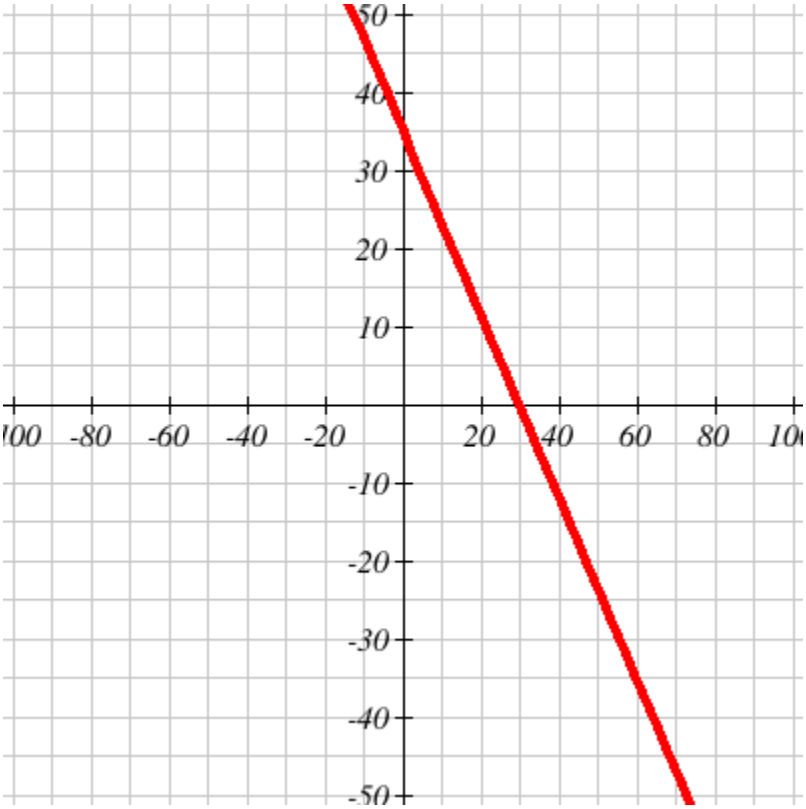
The slope of the line is _____

8.

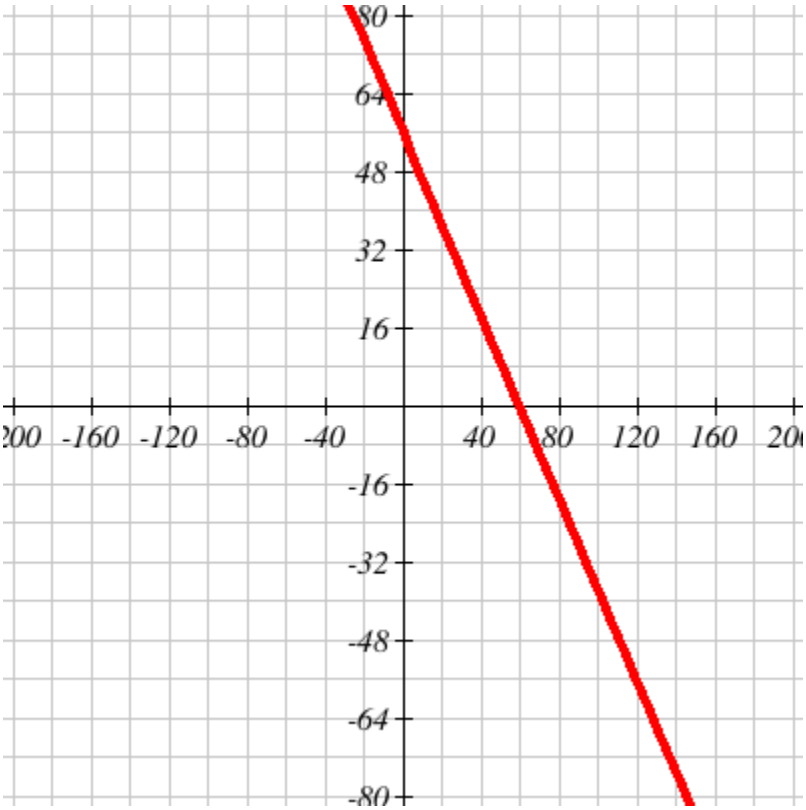
Find the slope of each line graphed below. Give your answers as reduced fractions.



The slope of this line is _____

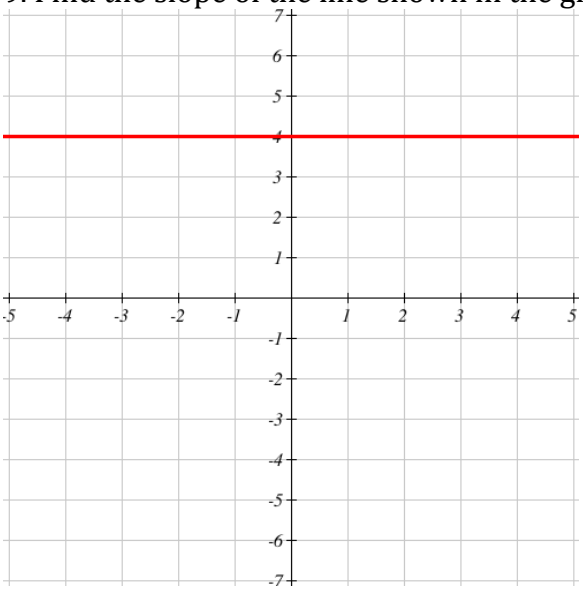


The slope of this line is _____



The slope of this line is _____

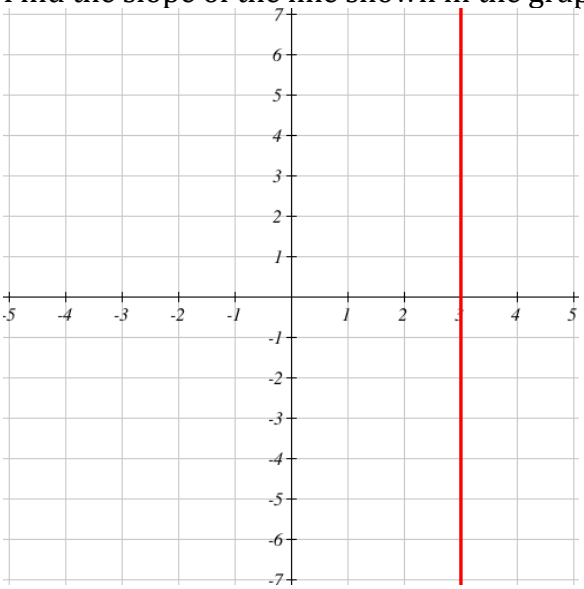
9. Find the slope of the line shown in the graph below. Answer DNE if the slope does not exist.



The slope is: _____

10.

Find the slope of the line shown in the graph below. Answer DNE if the slope does not exist



The slope is: _____

11.

Suppose you are driving. You notice that after driving for 3 hours, you are 135 miles from Seattle. You continue driving, and calculate that after driving 5 hours you are 215 miles from Seattle.

What was your rate of travel between these two observations?

_____ miles per hour

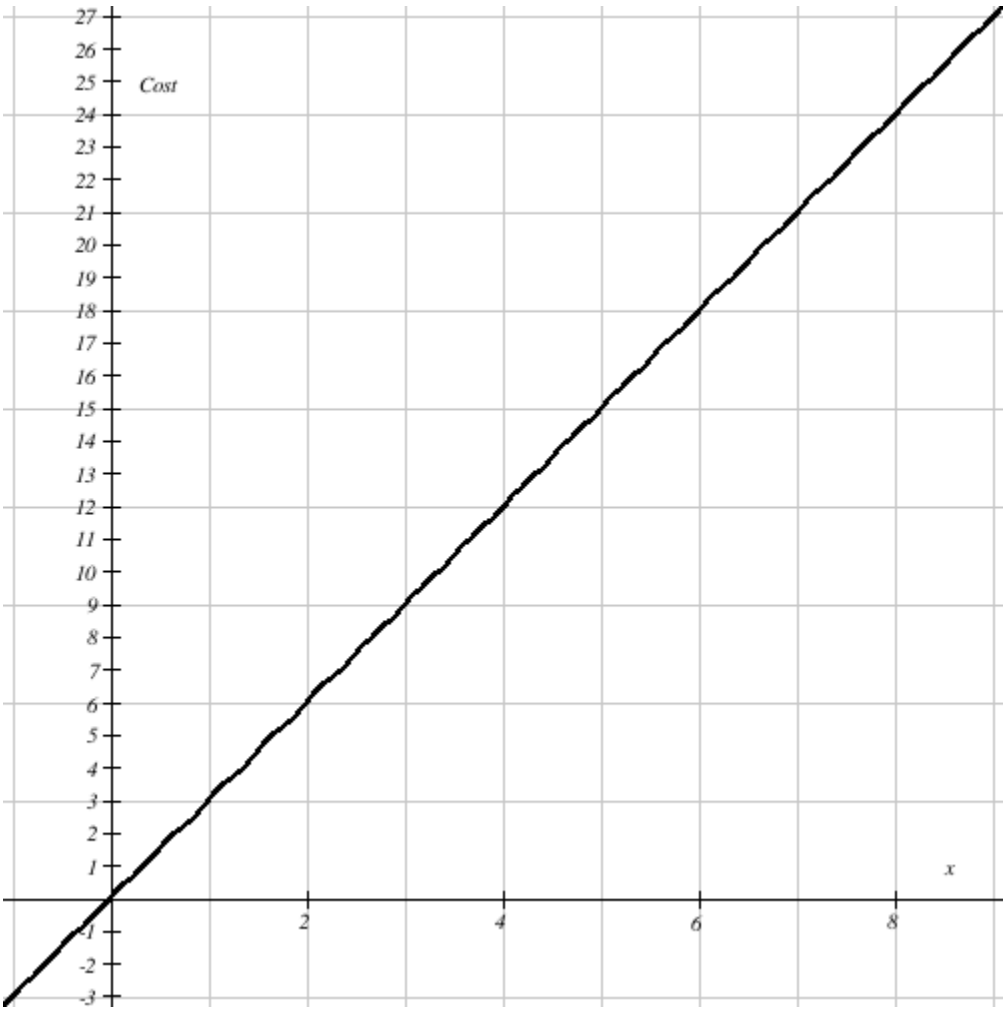
12.

Which of the following rates are equivalent to the rate 11 pounds per 2 months?

- 66 pounds per year
- $\frac{11}{2}$ pounds per month
- 5.5 pounds per month
- 55 pounds every 10 months
- one pound per $\frac{2}{11}$ months

13.

The graph below shows the cost of buying x square yards of carpet. Find the slope of the graph and interpret the result.



The slope of the graph is

What does the slope represent?

- The cost per square yard of carpet
- The size of the carpet
- The cost per hour of installation
- The cost of installation
- The total cost of the carpet

14.
Is the function f(x) shown in the table below a linear function?

x	-2	-1	0	1	2	3
f(x)	8	5	2	-1	-4	-7

- No, the ratio of change in input to change in output is not constant
- Yes, the ratio of change in input to change in output is constant
- Yes, each input has exactly one output
- No, there are multiple outputs for at least one input
- Triceratops

15.
Is the function f(x) shown in the table below a linear function?

X	-1	0	1	2	3	4
f(x)	-3	1	-3	-15	-35	-63

- No, there are multiple outputs for at least one input
- Yes, the ratio of change in input to change in output is constant
- Yes, each input has exactly one output
- No, the ratio of change in input to change in output is not constant
- Wombat

16.
Give three different points that lie on the line $y = 4x + 2$ by choosing different values for x .
Note that you must answer all three questions in order for your responses to be scored correctly.

If x is _____ , then the point on the line is _____.

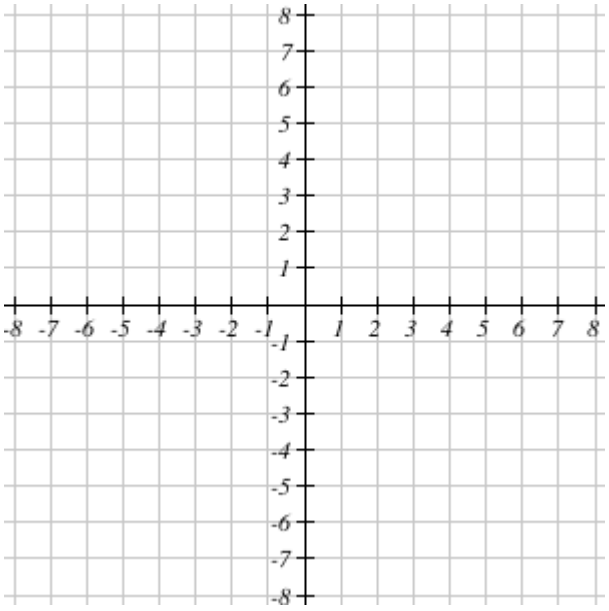
If x is _____, then the point on the line is _____.

If x is _____, then the point on the line is _____.

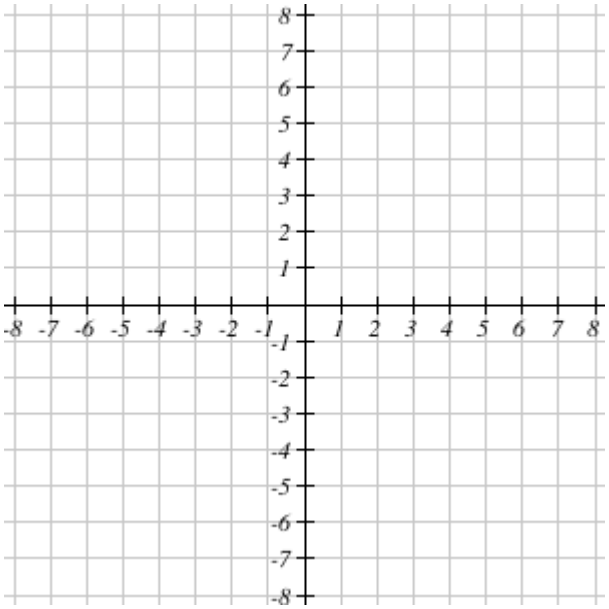
17.

Draw the graph of each of the 5 equations below. Make sure to scroll down to see all the graphs.

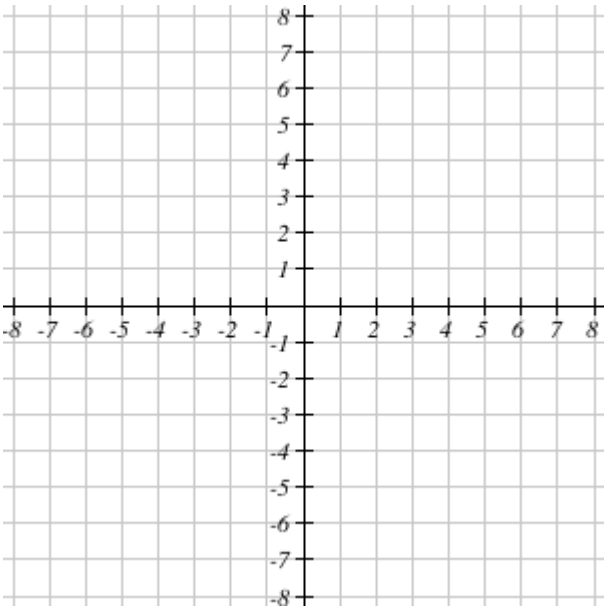
$h(x) = -\frac{5}{3}x + 2$



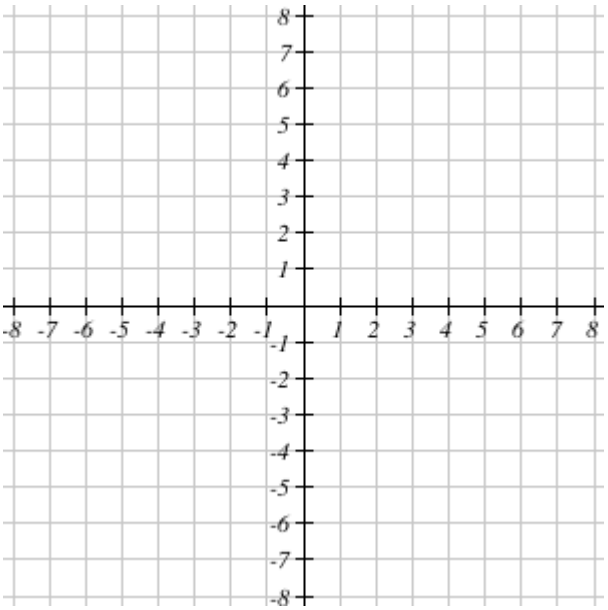
$g(x) = 0$



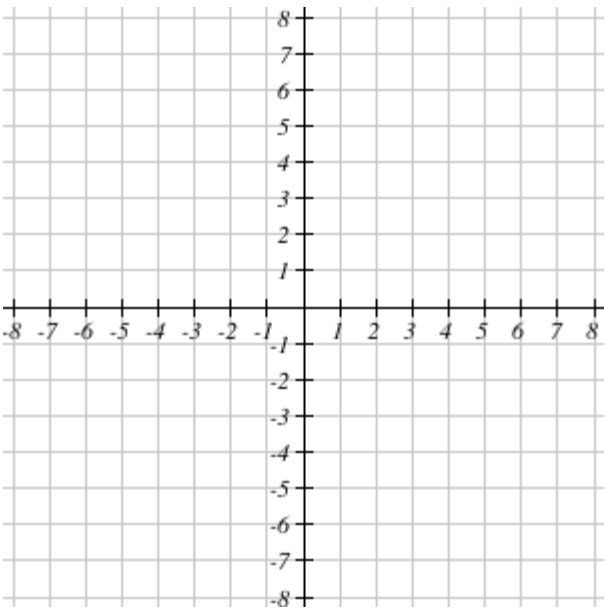
$x = 5$



$k(x) = -\frac{3}{5}x + 5$

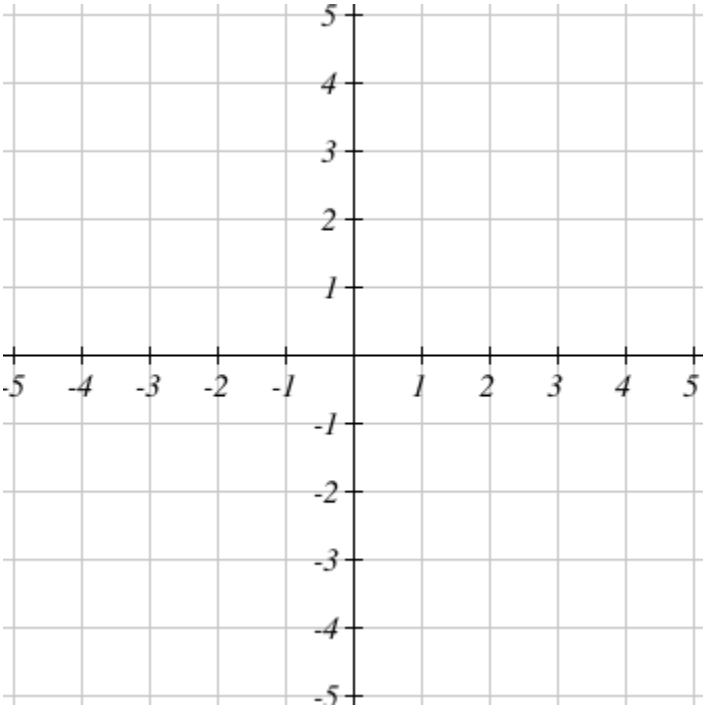


$q(x) = -\frac{2}{3}x - 5$



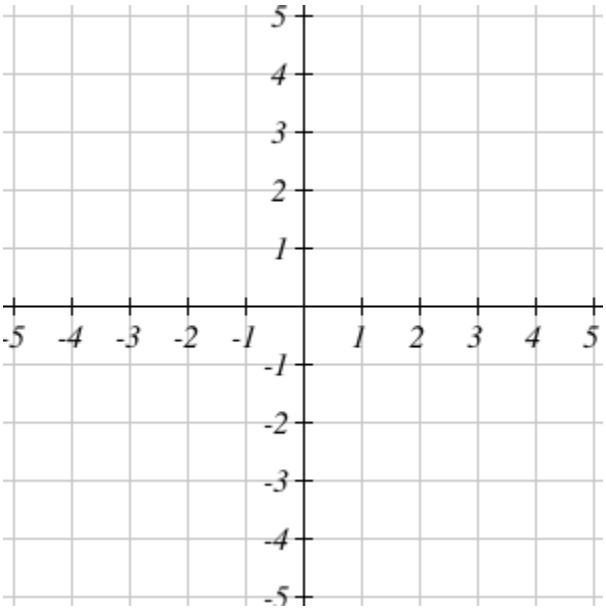
18.

Graph the line that has an x-intercept of (2,0) and y-intercept of (0,3).



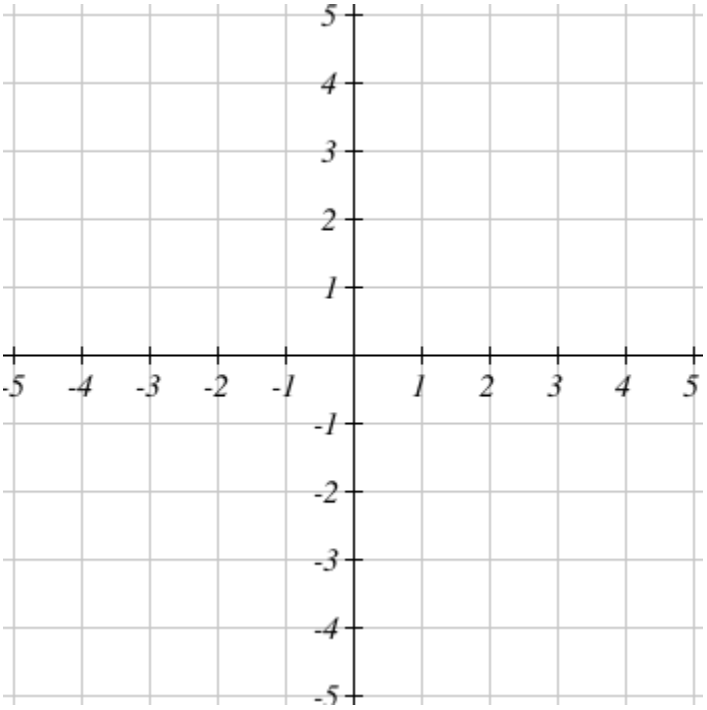
19.

Sketch a graph of $f(x) = -\frac{1}{2}x + 2$.



20.
Find the x-intercept and y-intercept of the graph of $4x + 2y = 8$. Then graph.

x-intercept = (_____,0)
y-intercept = (0, _____)



21.
Given the equation $y = -2x - 3$

The x intercept is: _____

The y intercept is: _____

22.
Find the x and y intercepts of the equation: $-2x - 5y = 30$

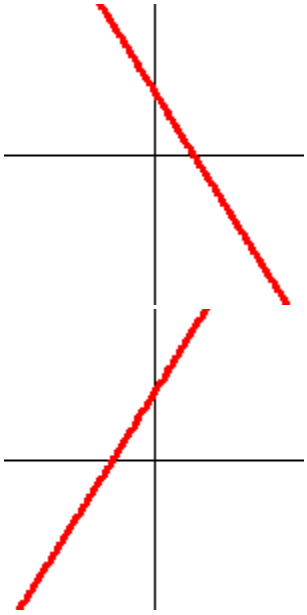
The intercepts are: _____

x intercept = (_____,0)

y intercept = (0, _____)

23.

The graphs shown below correspond to functions of the form $f(x) = mx + b$. Which of the graphs has $m > 0$ and $b < 0$?

- 
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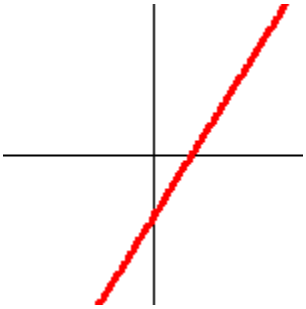
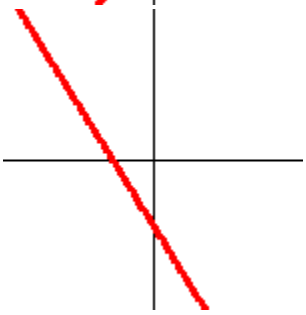
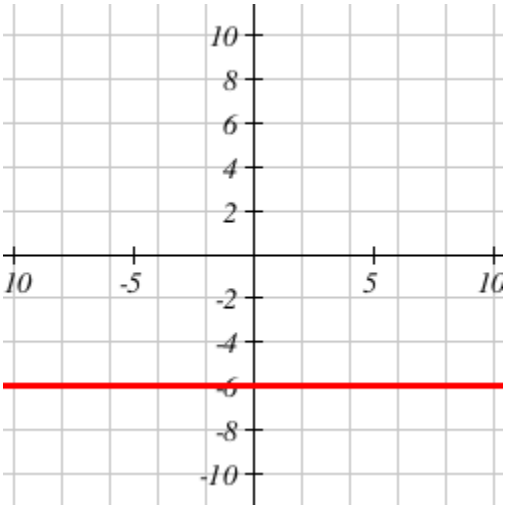
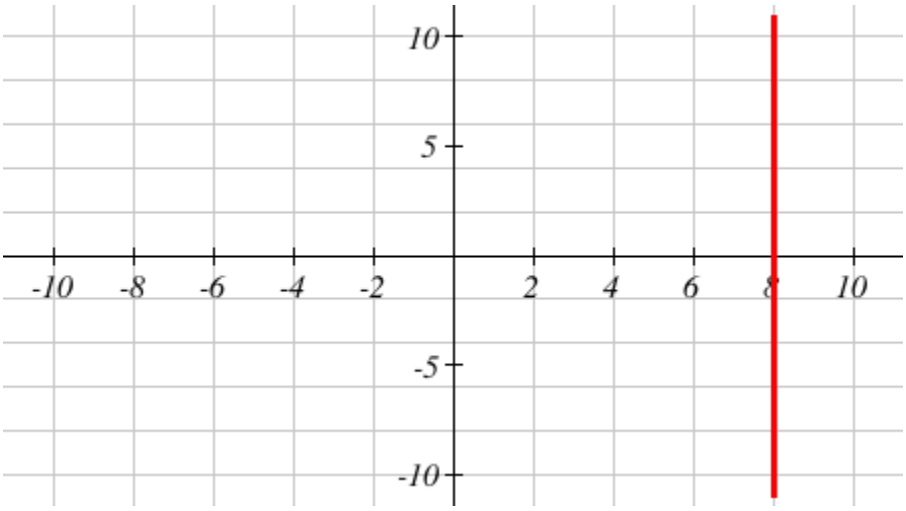
- 
- 

24.



Find the equation of the line shown.

25.



Find the equation of the line shown.

26.

Construct a linear function that passes through the point $(3,15)$. Give your answer is slope-intercept form and use rational numbers or integers.

$f(x) =$_____

27.

Put the following equation in slope-intercept form: $y - 3 = -\frac{1}{6}(x - 1)$

$y =$_____

28.

Find the equation for the line that passes through the points $(-5, -8)$ and $(-8, -9)$. Give your answer in the point-slope form $y = m(x - x_1) + y_1$.

$y =$_____

29.

Find the equation of the line with slope = 5 and passing through (7,-3). Write the equation in point-slope form AND slope-intercept forms. Include the full equation in your answers.

point-slope form: _____

slope-intercept form: _____

30.

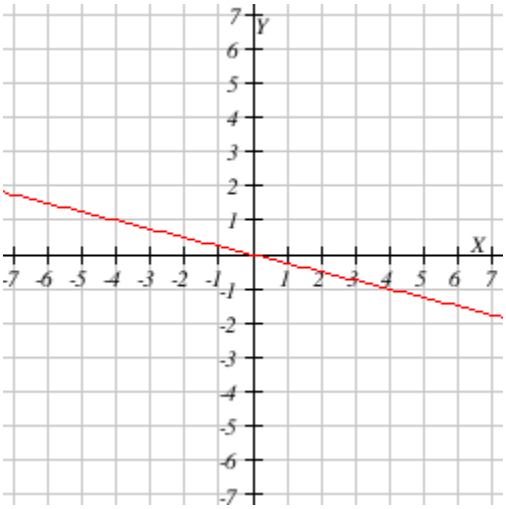
A line with equation $y = mx + b$ passes through the origin and the point $(7, -8)$. Find the values of m and b.

$m =$_____

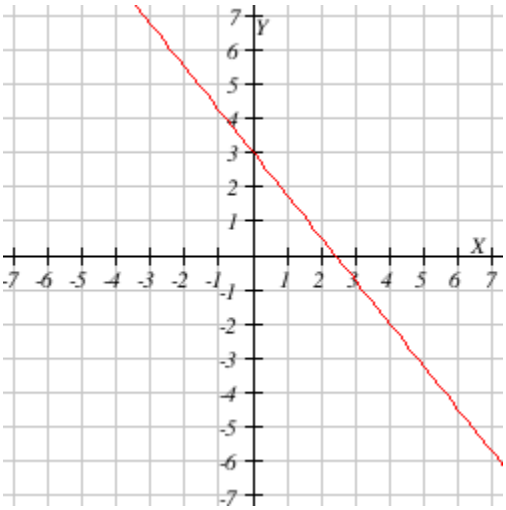
$b =$_____

31.

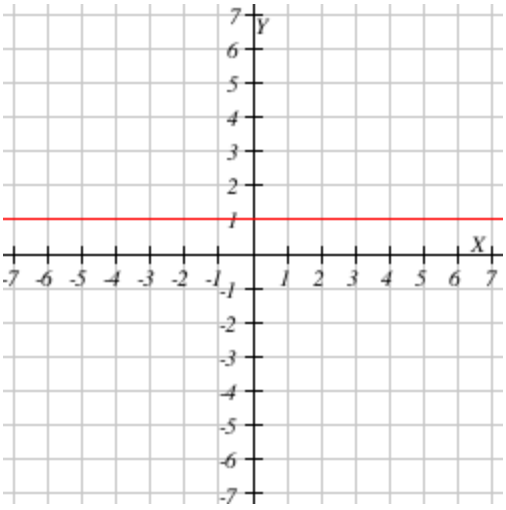
Give the equation of each line in the 5 graphs below. Make sure to scroll down to see all the graphs. Give your answers in slope-intercept form unless the line is vertical.



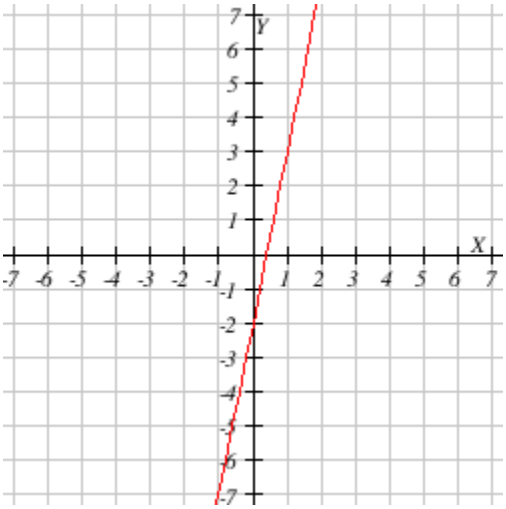
The equation of the line is:



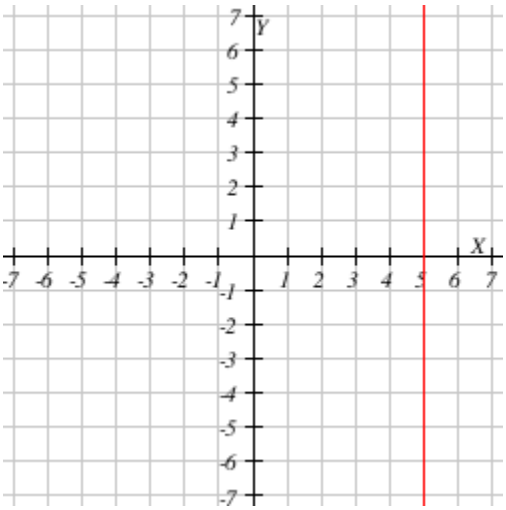
The equation of the line is:



The equation of the line is:



The equation of the line is:



The equation of the line is:

32.
Write an equation for a line parallel to $y = 4x - 2$ and passing through the point (1,1).

y =_____

33.
Construct two different linear functions $f(x)$ and $g(x)$ that are parallel to each other. Write them below in slope-intercept form.

$f(x)$ =_____

$g(x)$ =_____

34.
Two lines are perpendicular if...

- they have the same y-intercept
- they are not parallel
- they intersect at a right angle
- they never intersect
- they both own cats. Oh wait, that's purrrpendicular

35.
Write an equation for a line perpendicular to $y = -5x + 3$ and passing through the point (-15,1).

y =_____

36.
Find an equation of the line that is perpendicular to $8x - 10y = -4$ and has a y -intercept of 1 . Write your answer in slope-intercept form.

y = _____x +_____

37.
Construct two different linear functions $f(x)$ and $g(x)$ that are perpendicular to each other and have nonzero y -intercepts. Write them below in slope-intercept form.

$f(x)$ =_____

$g(x)$ =_____

38.
John is on vacation and needs to arrange transportation. A rental car costs 70 dollars per day plus a one-time cost of 20 dollars for insurance. Construct a function C(x) that gives the total cost of renting a car for x days.

C(x)= _____

If John has budgeted 370 dollars for the rental, how many days can he afford?

_____ days

39.
In 1991, the moose population in a park was measured to be 4040. By 1999, the population was measured again to be 4680. If the population continues to change linearly:

A.) Find a formula for the moose population, P , in terms of t , the years since 1990.

$P(t)$ =_____

B.) What does your model predict the moose population to be in 2002?

40.

Depreciation is the decrease or loss in value of an item due to age, wear, or market conditions. We usually consider depreciation on expensive items like cars. Businesses use depreciation as a loss when calculating their income and taxes.

One company buys a new bulldozer for $131500. The company depreciates the bulldozer linearly over its useful life of 25 years. Its salvage value at the end of 25 years is $19000.

A) Express the value of the bulldozer, *V*, as a function of how many years old it is, *t*. Make sure to use function notation.

B) The value of the bulldozer after 2 years is $_____.

Lecture 11

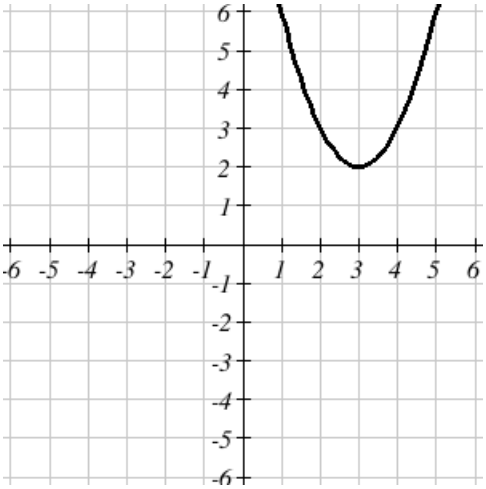
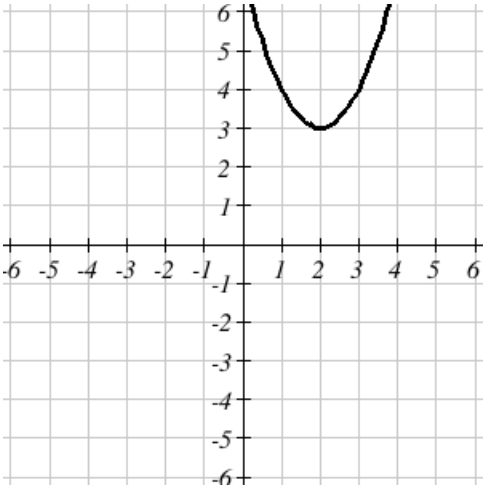
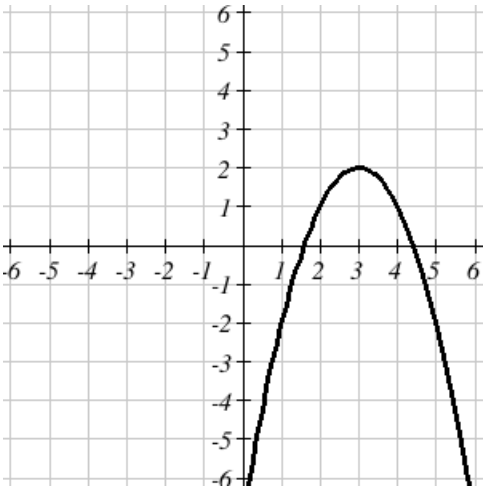
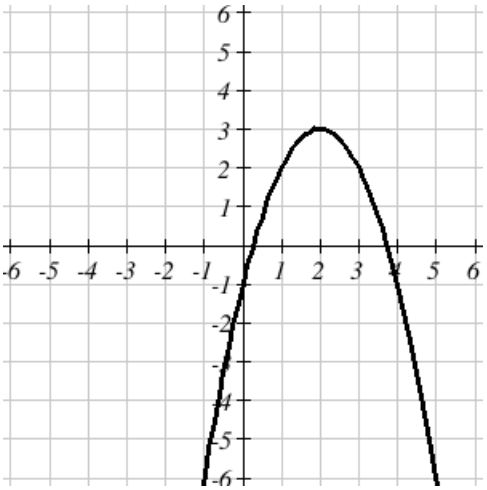
Quadratic function general form, graphs(parabolas), intercepts, vertex, standard form (and converting general/standard), domain/range, axis of symmetry, applications

1.
The vertex of a parabola is _____

- the highest or lowest point on a parabola
- the point where the parabola intersects its axis of symmetry
- the point where the parabola changes from increasing to decreasing
- all of the above
- none of the above

2.

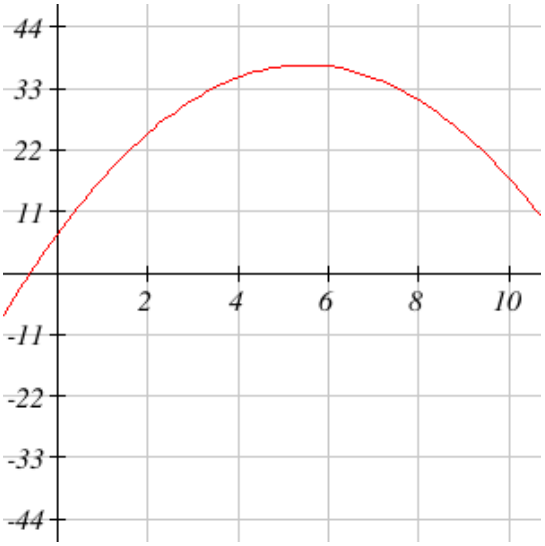
Which of these parabolas opens downwards and has its vertex at the point (2,3)?

3.
Describe how the graph of $g(x) = -1.6x^2$ compares to the graph of $f(x) = x^2$.

The graph of g(x) is (wider/narrower) than the graph of f(x).
The graph of g(x) opens in the (opposite/same) direction as the graph of f(x).

4.

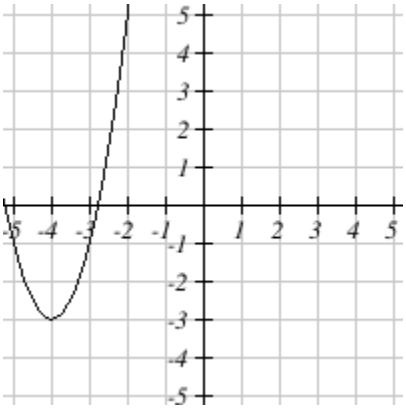


Use the y-intercept, vertex, and shape of the graph to determine which of the choices below is the equation for the parabola.

- $y = x^2 + 11x + 7$
- $y = x^2 - 11x - 7$
- $y = -x^2 + 11x - 7$
- $y = -x^2 - 11x + 7$
- $y = x^2 - 11x - 7$
- $y = -x^2 + 11x + 7$

5.

Consider the function graphed below.



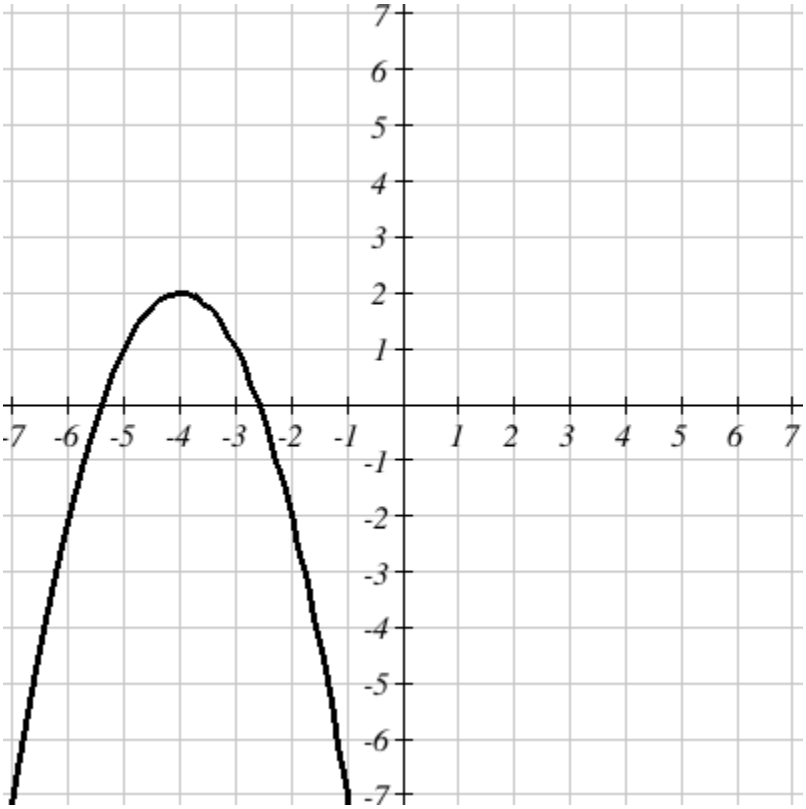
The function has a Select an answer minimum maximum value of at $x =$_____

The function is increasing on the interval(s): _____

The function is decreasing on the interval(s): _____

6.

For the parabola graphed below, identify its vertex, state the intervals where it is increasing and decreasing.



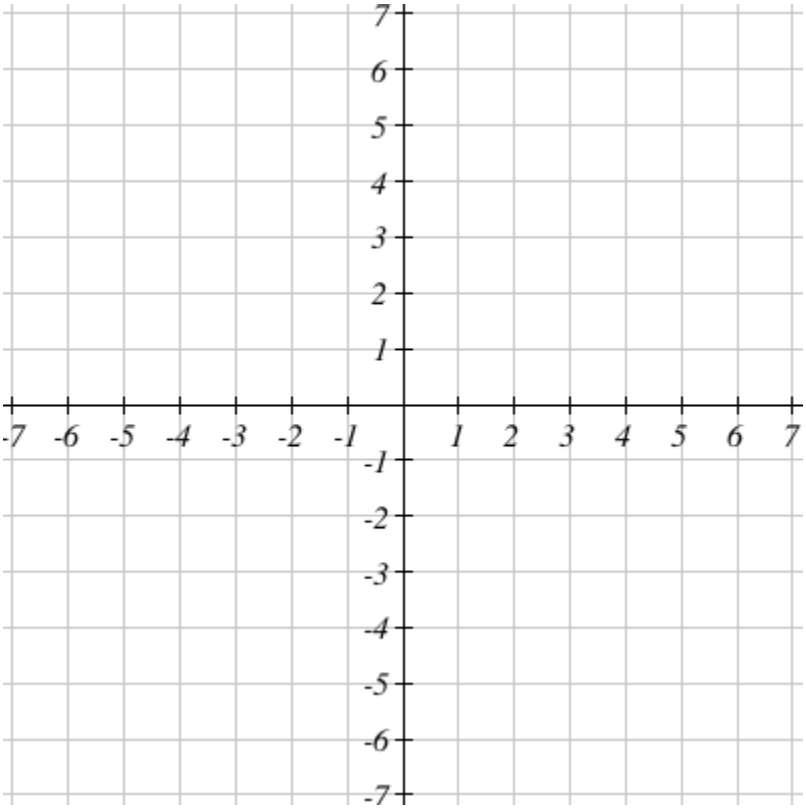
The vertex of the parabola is _____

The parabola is increasing on the interval_____

The parabola is decreasing on the interval_____

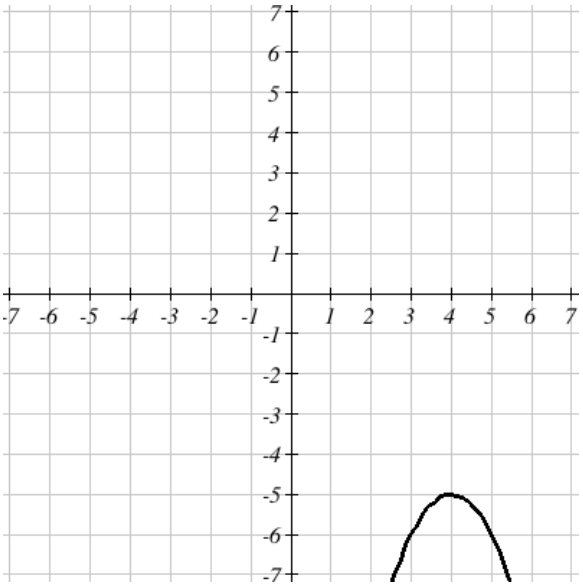
7.

Graph $f(x) = x^2 - 8x + 15$ below.



8.

For the parabola graphed below, identify its vertex, axis of symmetry, and state if it opens upwards or downwards.



The vertex of the parabola is_____

The axis of symmetry is_____

The parabola opens Select an answer downwards upwards_____

9.

Give three different points that lie on the parabola $y = x^2 + 5x + 4$.

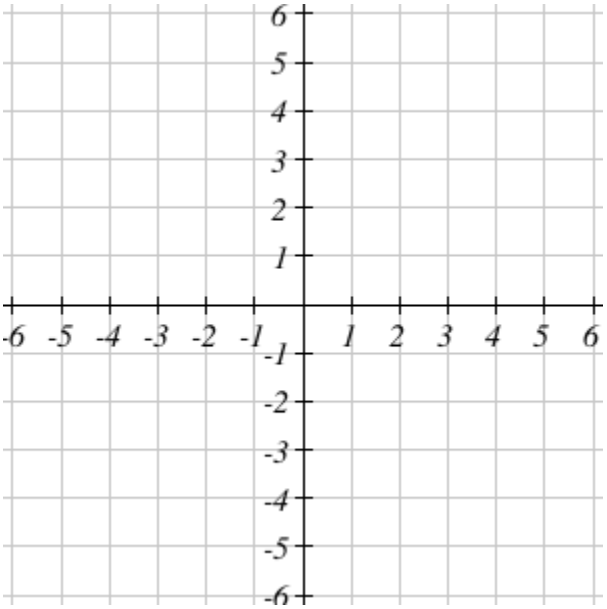
If x is _____, then the point on the parabola is _____.

If x is _____, then the point on the parabola is _____.

If x is _____, then the point on the parabola is _____.

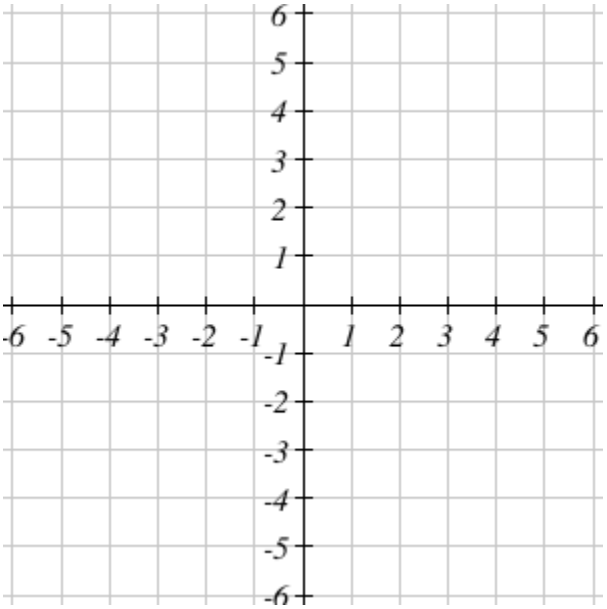
10.

Sketch a graph of $f(x) = -x^2 + 1$



11.

Sketch a graph of $f(x) = -2x^2 - 2$

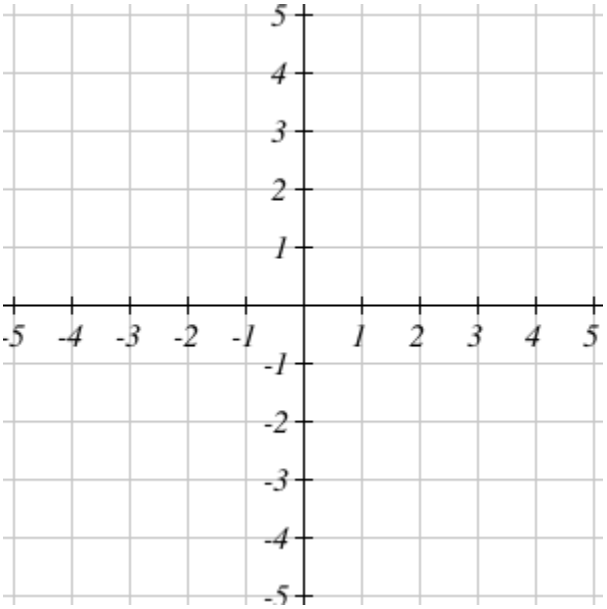


12.

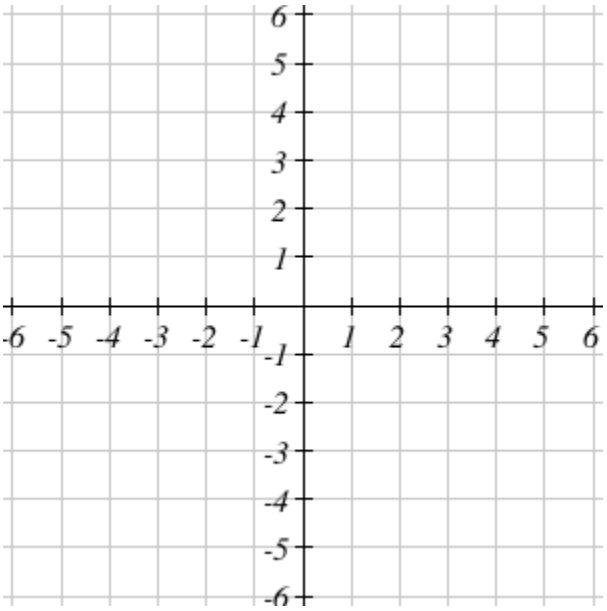
Identify the vertex, and the y-intercept then graph $f(x) = x^2 + 2x + 2$.

The vertex is (_____,_____)

The y -intercept is (0, _____)



13.
Graph the equation $y = x^2 - 4x + 1$ below and then state its domain and range.



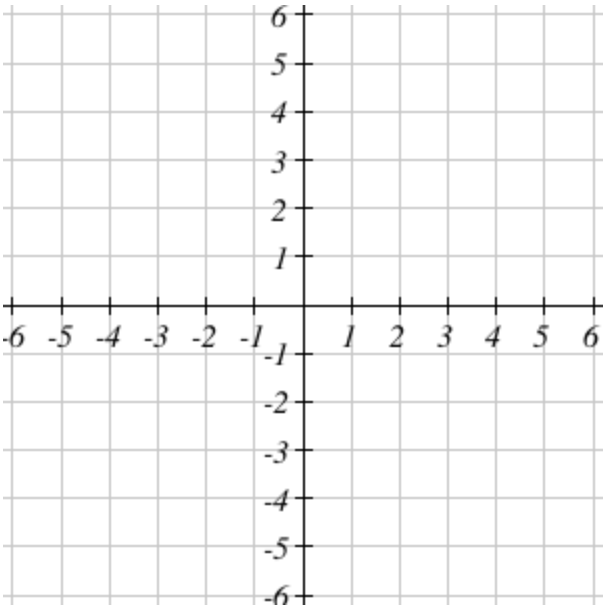
The domain of the equation is:

- $x \leq 2$
- All real numbers
- $x \leq -3$
- $x \geq -3$
- $x \geq 2$

The range of the equation is:

- All real numbers
- $y \geq -3$
- $y \leq 2$
- $y \leq -3$
- $y \geq 2$

14.
Graph the equation $y = -x^2 + 8x - 13$ below and then state its domain and range.



The domain of the equation is:

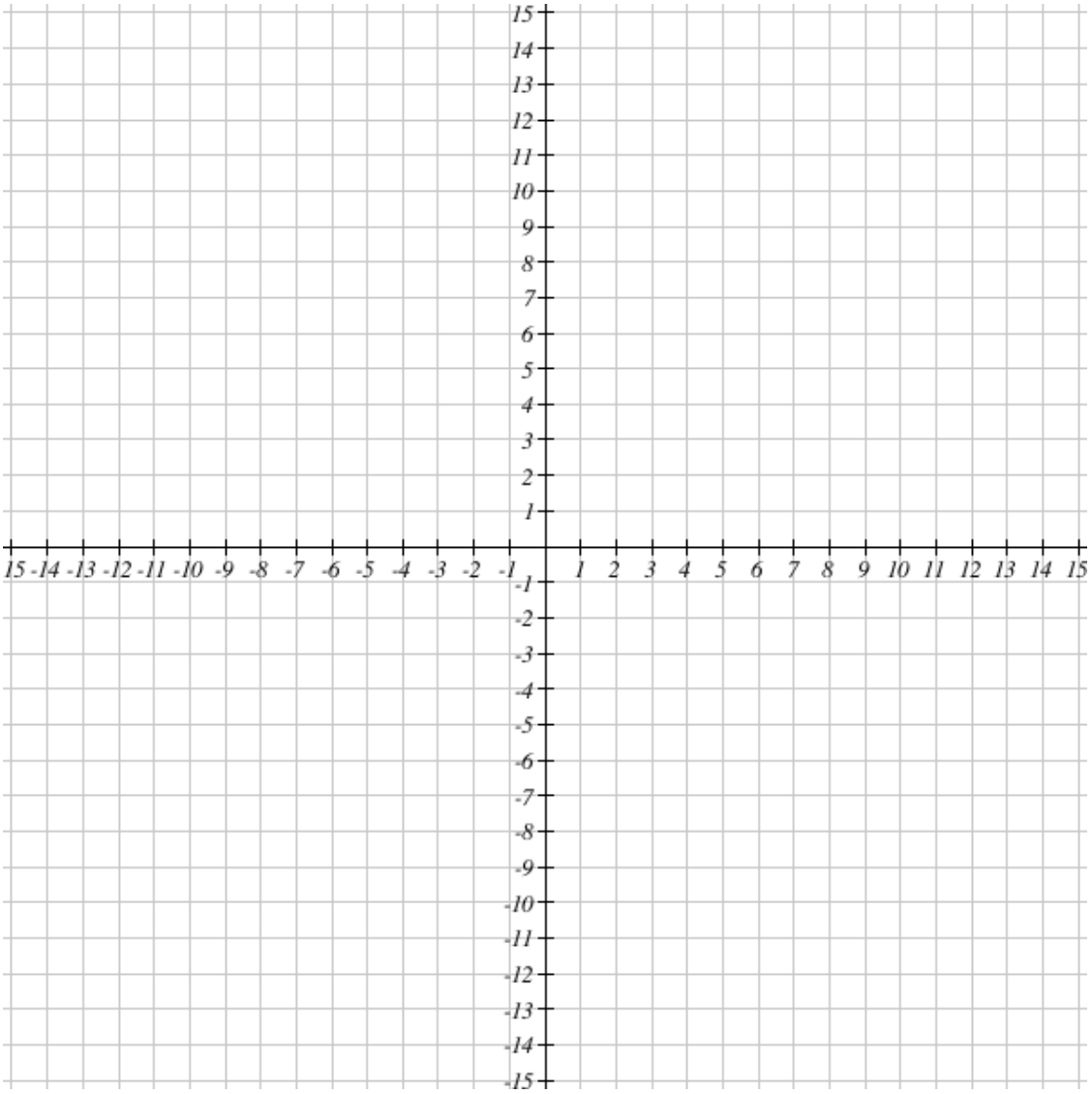
- $x \leq 4$
- $x \leq 3$
- $x \geq 4$
- All real numbers
- $x \geq 3$

The range of the equation is:

- $y \leq 3$
- $y \geq 3$
- All real numbers
- $y \geq 4$
- $y \leq 4$

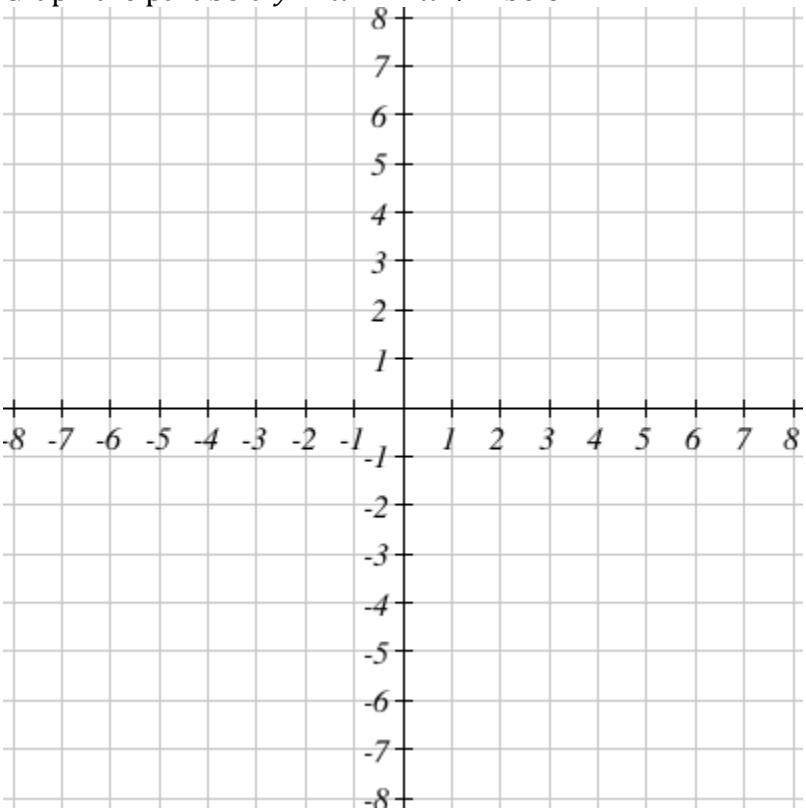
15.

Graph the function $g(x) = -0.5x^2 - 4x - 7$ on the axes below



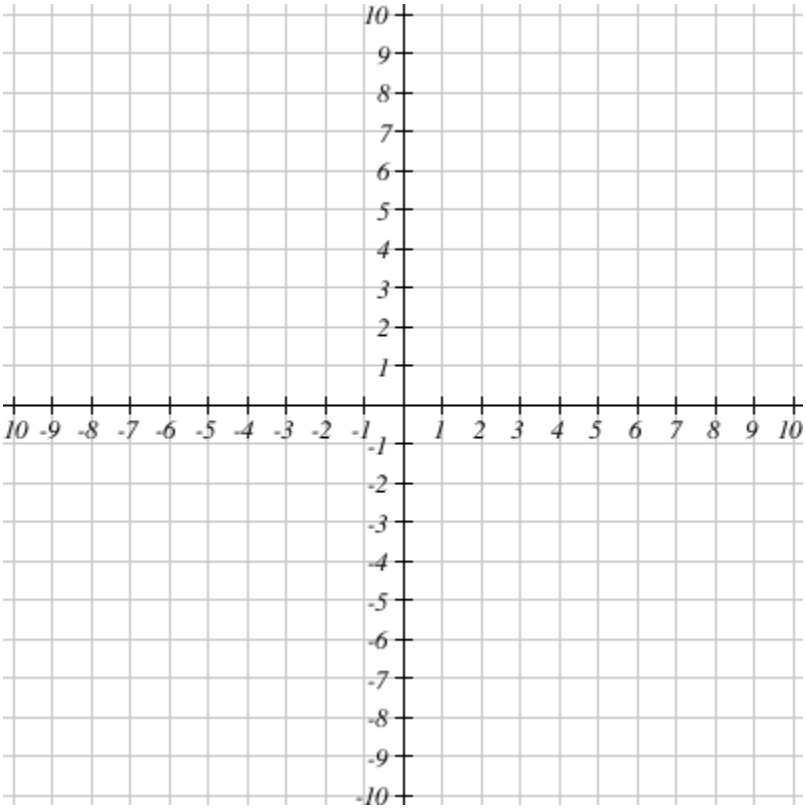
16.

Graph the parabola $y = x^2 - 4x + 1$ below.



17.
Graph the parabola then fill in the blanks about the vertex, any intercepts, the domain, and range. Enter intercepts as ordered pairs, aka points.

$y = x^2 - 8x + 12$



Vertex =_____
y -intercept =_____
x -intercepts =_____
Domain: _____
Range: _____
Equation of the Axis of Symmetry: _____

18.
Consider the quadratic function $f(x) = -x^2 + 4x + 5$.

Determine the following:

The left x -intercept is $x =$_____
The right x -intercept is $x =$_____
The y -intercept is $y =$_____
The vertex is (_____ , _____)
The line of symmetry has the equation_____

19.
Consider the parabola given by the equation: $f(x) = -4x^2 + 24x - 24$

Find the following for this parabola:

A) The vertex: _____

B) The vertical intercept is the point_____

C) Find the coordinates of the two x -intercepts of the parabola and write them as ordered pairs. First, give the exact values, and then give decimals rounded to two decimal places.

Exact coordinates: _____

Decimal coordinates: _____

20.
Let $f(x) = 3x^2 - 18x + 19$. Find the x -intercepts of the graph of $y = f(x)$.

The x -intercepts are located at

- One or more solutions: _____
- No solution

(Give the coordinates of ALL the x -intercepts, or if no x -intercepts exist, select that choice)

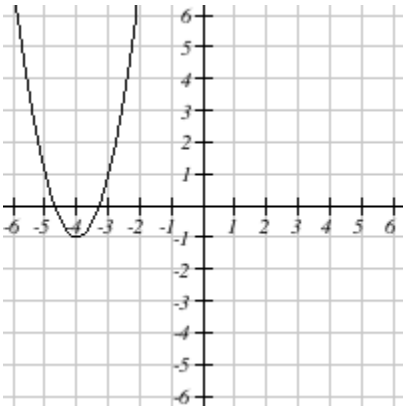
21.
Find b and c so that $y = -6x^2 + bx + c$ has vertex $(5, -9)$.

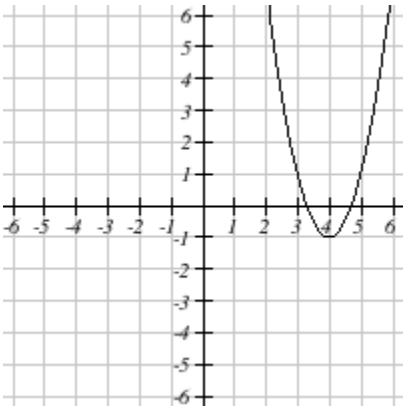
$b =$ _____.

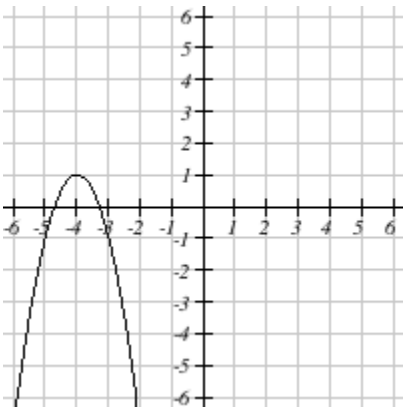
$c =$ _____.

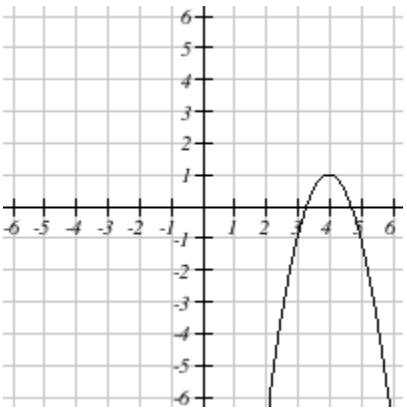
22.
Match the function with its graph.

$y = 2(x + 4)^2 - 1$

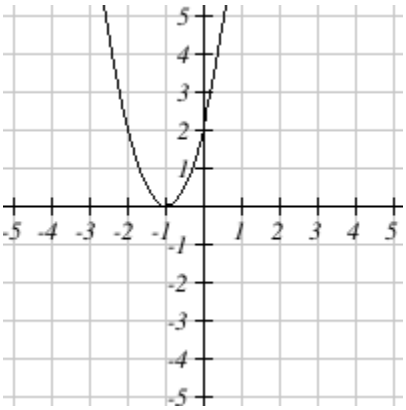








23.
Write an equation (any form) for the quadratic graphed below:



y =_____

24.

Determine the equation of the quadratic function with vertex $(1,4)$ and passing through the point $(-1,16)$

$y =$ _____

25.

Given the following quadratic function: $y = x^2 - 10x + 16$

a) Complete the square to write the quadratic in standard form: $y =$ _____

b) Identify the vertex of the parabola: _____

26.

For each quadratic expression below, complete the square to write it in standard form.

a) $x^2 + 4x + 5$

Standard form: _____

b) $x^2 - 16x + 56$

Standard form: _____

27.

Find the formula, in standard form $y = ax^2 + bx + c$, for a quadratic that has roots at $x = \sqrt{17}$ and $x = -\sqrt{17}$, and has leading coefficient of 1.

y =_____

28.

Find the formula, in standard form $y = ax^2 + bx + c$, for a quadratic that has roots at $x = -3 + 3\sqrt{7}$ and $x = -3 - 3\sqrt{7}$, and has leading coefficient of 1.

y =_____

29.
On Utapau, while riding a boga, General Kenobi dropped his lightsaber 440 feet down onto the platform where Commander Cody was. $h(s) = -14s^2 + 440$, gives the height after s seconds.

a) What type of function would best model this situation?
- Rational or Inverse
- Linear
- Quadratic
- Exponential

b) Evaluate $h(5)$ =_____

30.
This question is not about solving the stated problem, but about understanding it.

A rocket is launched, and its height above sea level t seconds after launch is given by the equation $h(t) = -4.9t^2 + 1400t + 220$.

a) From what height was the rocket launched?

To answer this question, we'd find:
- The t intercept
- The h intercept
- The t coordinate of the vertex
- The h coordinate of the vertex

b) What is the maximum height the rocket reaches?

To answer this question, we'd find:
- The t intercept
- The h intercept
- The t coordinate of the vertex
- The h coordinate of the vertex

c) If the rocket will splash down in the ocean, when will it splash down?

To answer this question, we'd find:
- The t intercept
- The h intercept
- The t coordinate of the vertex
- The h coordinate of the vertex

31.
A rocket is fired upward from some initial distance above the ground. Its height (in feet), h, above the ground t seconds after it is fired is given by $h(t) = -16t^2 + 80t + 1056$.

What is the rocket's maximum height?
_____feet

How long does it take for the rocket to reach its maximum height?
_____seconds

After it is fired, the rocket reaches the ground at t=_____ seconds

32.
A person standing close to the edge on top of a 56-foot building throws a ball vertically upward. The quadratic function $h = -16t^2 + 104t + 56$ models the ball's height above the ground, h , in feet, t seconds after it was thrown.

a) What is the maximum height of the ball?

_____feet

b) How many seconds does it take until the ball hits the ground?

_____seconds

33.
Suppose that you have 760 feet of rope and want to use it to make a rectangle. What dimensions should you make your rectangle if you want to enclose the maximum possible area?
The length should be _____ feet
The width should be _____ feet
The total area enclosed is _____ square feet.

34.
Josh wants to build a rectangular enclosure for his animals. One side of the pen will be against the barn, so he needs no fence on that side. The other three sides will be enclosed with wire fencing. If Josh has 450 feet of fencing, you can find the dimensions that maximize the area of the enclosure.

a) Let w be the width of the enclosure (perpendicular to the barn) and let l be the length of the enclosure (parallel to the barn). Write an function for the area A of the enclosure in terms of w . (HINT first write two equations with w and l and A . Solve for l in one equation and substitute for l in the other).
$A(w) =$_____
b) What width w would maximize the area?
w = _____ft
c) What is the maximum area?
A = _____square feet

Lecture 12

Power functions, Terminology, smoothness, continuity, end behavior, zeros, multiplicity, graph sketching. Division algorithm, synthetic division

1.
When a polynomial f(x) is evaluated at a particular value of x, is it possible for more than one value to result?

- Yes, a polynomial will have more than one output for every input.
- No, a polynomial can only have more than one output for some inputs.
- No, a polynomial is a function so it can only have one output for each input.
- Yes, a polynomial can have more than one output for some inputs.

2.
Let $f(x) = 3 \cdot x^4$.

$f\left(-\frac{1}{3}\right)$ =_____

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

$f(-2)$ =_____

4.
Add the polynomials:

$(11x^5 - 8x^4 + 4x^3 - 10x^2) + (-x^5 + 11x^4 + 5x^3 + 6)$=_____

5.
Perform the indicated operation and simplify:

$\left(\frac{1}{7}x + \frac{1}{2}\right)^2$ =_____

6.
Describe the end behavior (long run behavior) of $f(x) = x^2$

As $x \to -\infty$, $f(x) \to$
- ∞
- -∞
- 0

As $x \to \infty$, $f(x) \to$
- ∞
- -∞
- 0

7.
Describe the long run behavior of $f(x) = x^9$

As $x \to -\infty$, $f(x) \to$
- ∞
- -∞
- 0

As $x \to \infty$, $f(x) \to$
- ∞
- -∞
- 0

8.
Describe the long run behavior of $f(r) = -2r^9 - 5r^7 - r^3 + 5$

As $r \to -\infty$, $f(r) \to$
- ∞
- -∞
- 0

As $r \to \infty$, $f(r) \to$
- ∞
- -∞
- 0

9.
Describe the long run behavior of $f(n) = 2(n+4)^3(n-3)^2(n-1)^3$

As $n \to -\infty$, $f(n) \to$

- ∞
- -∞
- 0

As $n \to \infty$, $f(n) \to$

- ∞
- -∞
- 0

10.
Find the degree, leading coefficients, and the maximum number of real zeros of the polynomial.

$f(x) = 6x^8 - 3 + 3x^5 + 5x^7$

Degree =_____

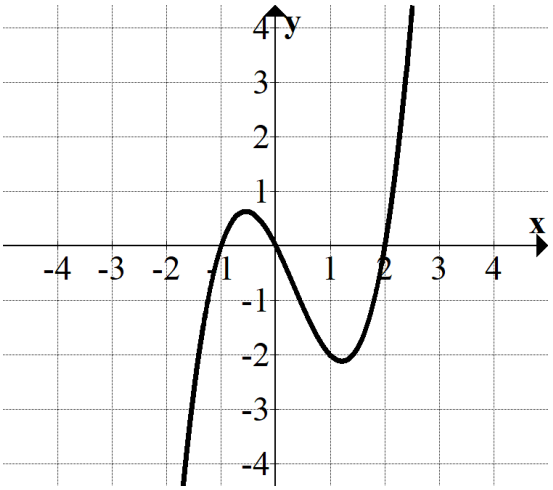
Leading Coefficient =_____

Maximum number of real zeros =_____

11.
Given the function $f(r) = 5r^{12} + 2r^2 + r^{11} + r$

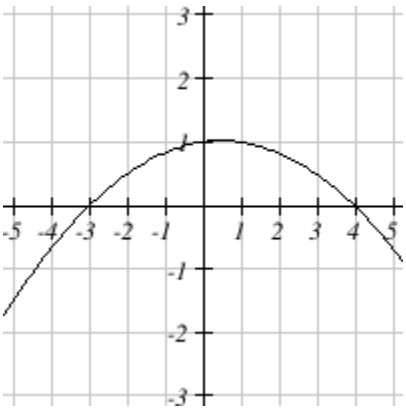
There are at most _____ x-intercepts, and at most_____ turning points.

12.



What is the least possible degree of the polynomial graphed above? _____

13.



What is the least possible degree of the polynomial graphed above? _____

14.

Given the function $P(x) = (x - 6)(x + 5)(x - 3)$

its P -intercept is _____

its x -intercepts are _____

15.

Given the function $f(x) = 4x^4 - 8x^3 - 140x^2$:

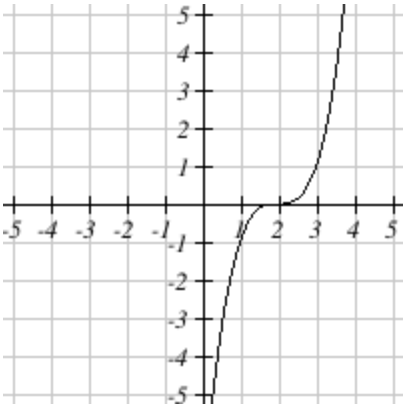
its f -intercept is _____

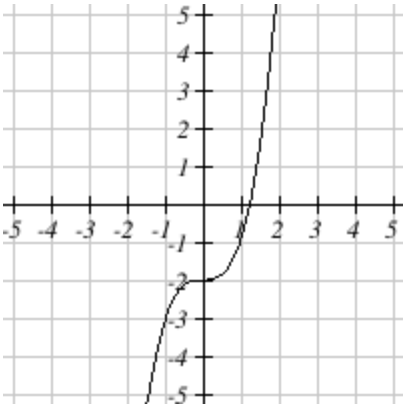
its x -intercepts are _____

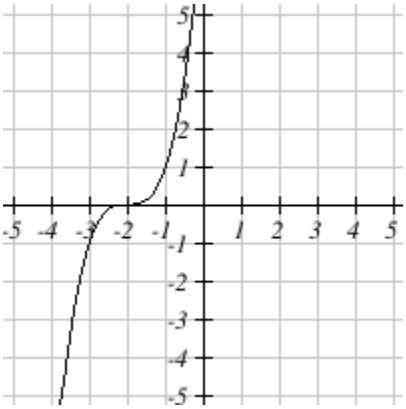
16.

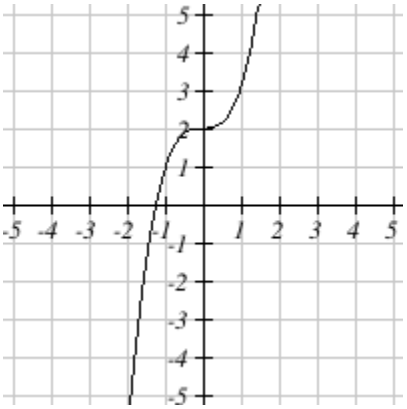
Pick the graph of the following function.

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





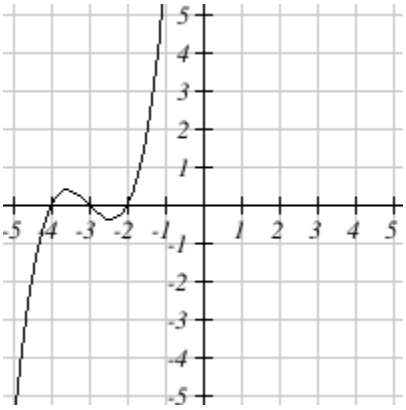


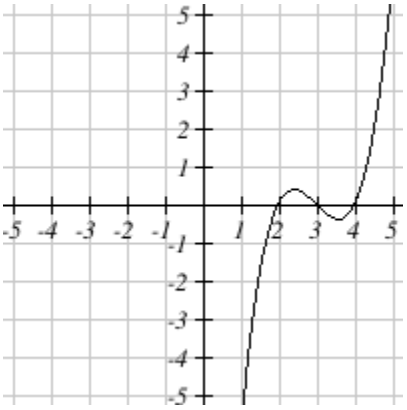


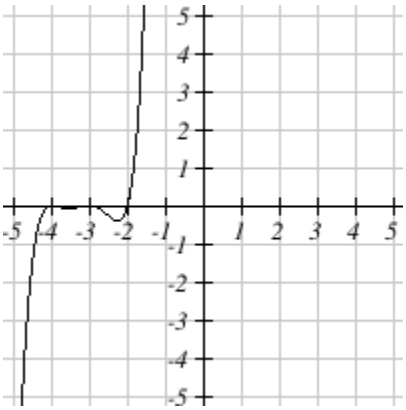
17.

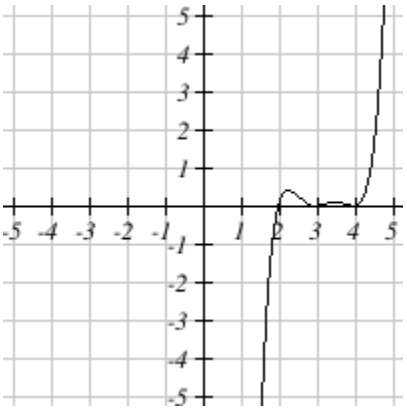
Pick the graph of the following function.

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





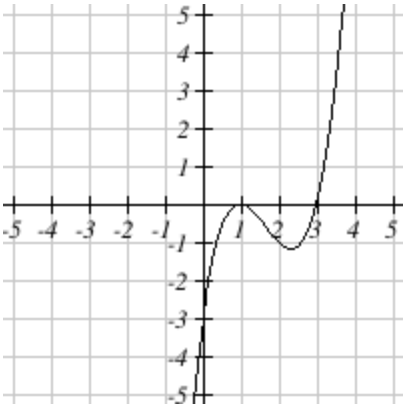


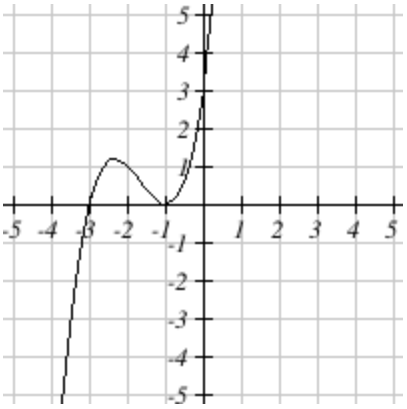


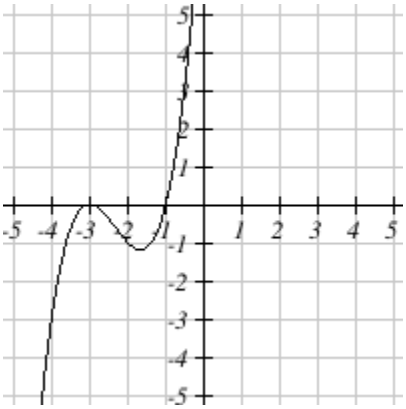
18.

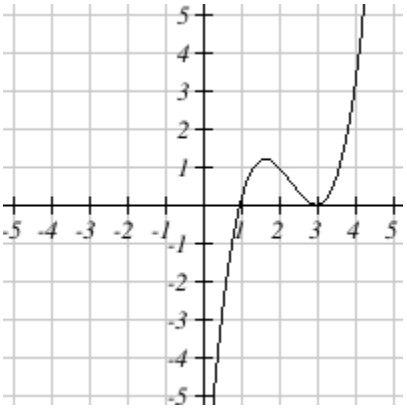
Pick the graph of the following function.

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



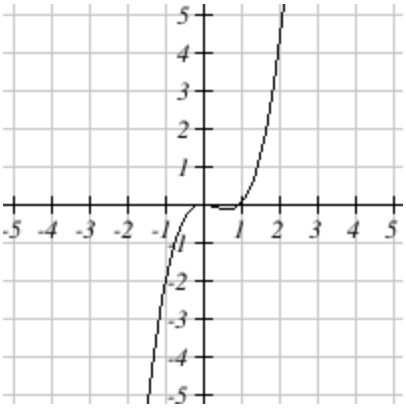
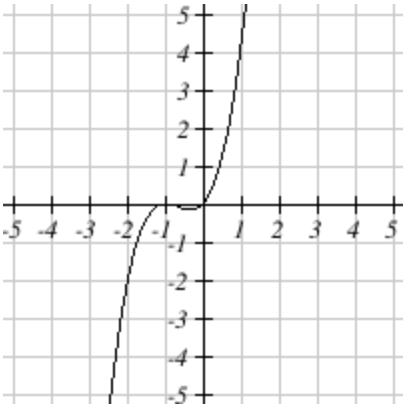
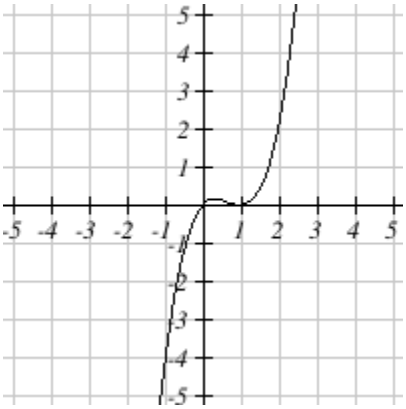
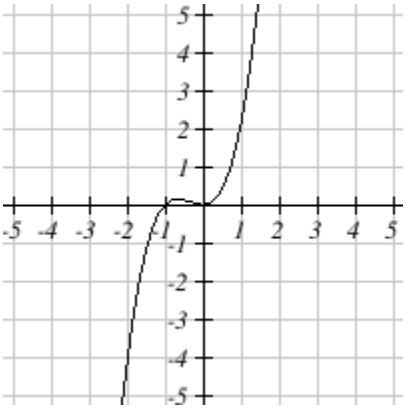






19.
Pick the graph of the following function.

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

20.
The polynomial of degree 5, $P(x)$, has leading coefficient 1, has roots of multiplicity 2 at $x = 3$ and $x = 0$, and a root of multiplicity 1 at $x = -3$.

Find the formula for $P(x)$.
$P(x) =$ _____

21.
The polynomial of degree 4, $P(x)$, has a root of multiplicity 2 at $x = 4$ and roots of multiplicity 1 at $x = 0$ and $x = -4$. It goes through the point $(5,9)$.

Find a formula for $P(x)$.
$P(x) =$ _____

22.

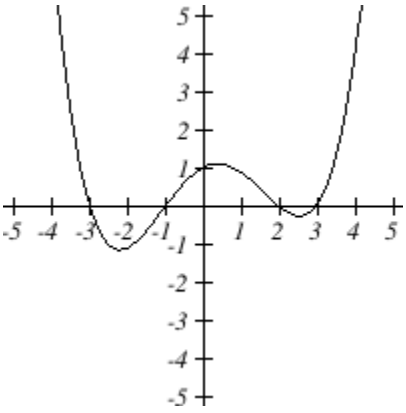
The polynomial of degree 3 , $P(x)$, has a root of multiplicity 2 at $x = 5$ and a root of multiplicity 1 at $x = -4$. The y -intercept is $y = -10$.

Find a formula for $P(x)$.

$P(x) =$_____

23.

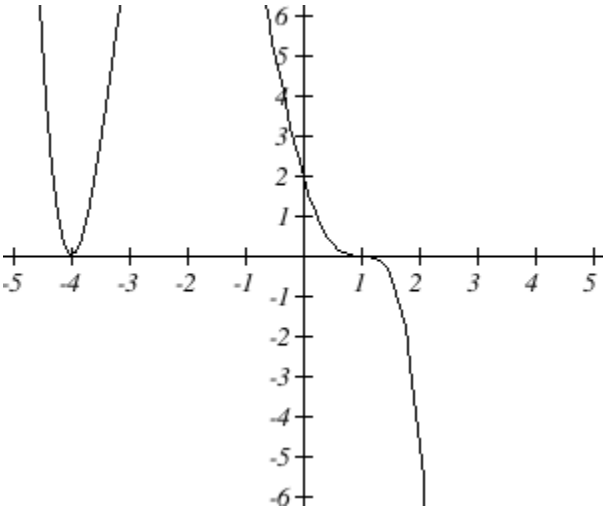
Write an expression in factored form for the polynomial of least possible degree graphed below.



y(x) =_____

24.

Write an expression in factored form for the polynomial of least possible degree graphed below.



y(x) =_____

25.

Find the quotient and remainder using long division for: $\frac{2x^3-14x^2+7x-30}{2x^2+5}$

The quotient is_____
The remainder is_____

26.

Find the quotient and remainder using long division for: $\frac{x^2+6x+15}{x+3}$.

The quotient is_____
The remainder is_____

27.

Divide. If there is a remainder, express it in the form $\frac{r}{x+2}$.

$(x^3 - 5x - 2) \div (x + 2)$ =_____

28.

Divide. If there is a remainder, express it in the form $\frac{r}{x-4}$.

$(x^3 + 3x^2 - 33x + 27) \div (x - 4)$ =_____

29.

Find the quotient and remainder using synthetic division for: $\frac{x^3+8x^2+17x+14}{x+2}$

The quotient is_____
The remainder is_____

30.

Find the quotient and remainder using synthetic division: $\frac{x^3+10}{x+2}$

The quotient is_____

The remainder is_____

31.

Find the quotient and remainder using synthetic division: $\frac{x^4-5x^3-31x-25}{x-6}$

The quotient is_____

The remainder is_____

32.

Find the quotient and remainder using synthetic division for

$$\frac{x^5 - x^4 + 5x^3 - 5x^2 + 7x - 10}{x - 1}$$

The quotient is_____

The remainder is_____

Lecture 13

Intro, Imaginary unit, roots of negative numbers, complex numbers, operations, conjugate, division/rationalizing, solutions to quadratic equations, powers of i.

1.

$\sqrt{-1} =$

- 1
- i
- $-i$
- -1

2.

For the complex number $-1 - 20i$ ...
The real part is _____
The imaginary part is _____

3.

Express $\sqrt{-100}$ as a complex number, in terms of *i*:

$\sqrt{-100}$ = _____

4.

Express $7 - \sqrt{-81}$ as a complex number in the form $a + bi$.
$7 - \sqrt{-81}$ = _____

5.

Express in terms of i:
$\sqrt{-26} =$ _____

6.

Express in terms of i and simplify:

$\sqrt{-18}$=_____

7.

Simplify the expression:
$\sqrt{-80} =$_____

8.
Perform the indicated operations & simplify.

Add: $(14 - 25i) + (5 + 17i)$
sum =_____

Subtract: $(14 - 25i) - (5 + 17i)$
difference =_____

9.
Perform the indicated operation & simplify. Express the answer in terms of *i* (as a complex number).

$\sqrt{-7} \cdot \sqrt{-175}$ =_____

10.

Perform the indicated operation & simplify. Express the answer in terms of *i* (as a complex number).
$(3i)(-12i) =$ _____

11.
Multiply and express your answer as a complex number.

$(4 - 7i)(-6 + 8i)$ =_____

12.
Perform the indicated operation & simplify. Express the answer as a complex number.

$(6 - 11i)(-7 + 5i)$ =_____

13.
Multiply and express your answer as a complex number.

$(6 + 5i)(6 + 5i) =$_____

14.
Perform the indicated operation & simplify. Express the answer in terms of *i* (as a complex number).

$2i(4 + 7i)$ =_____

15.
Perform the indicated operation & simplify. Express the answer in terms of *i* (as a complex number).

$(2 + 2i)(3 + 5i)(4 + 4i)$ =_____

16.
What is the complex conjugate of the number $10 + 4i$? _____

17.
In this problem you are going to investigate what happens when you multiply a complex number by its conjugate using the number $3 - 3i$.

First, multiply it by something that is not its conjugate:
$(3 - 3i)(-8 - 2i)$ =_____

Now, multiply it by its conjugate:
$(3 - 3i)(3 + 3i)$ =_____

You should notice a difference in those two results. To test it, try another one:
$(-10 - 4i)(-10 + 4i)$ =_____

When you multiply a complex number by its conjugate the result will be a(n)

- real
- hyperreal
- surreal
- imaginary

number.

18.
Simplify:

$\frac{3+i}{4i}$ =_____

19.
Divide and simplify:
$(192 + 89i) \div (-12 + 11i)$ =_____

20.
Simplify:

$\frac{-2i}{2+5i} =$_____

21.
Simplify each of the following completely:

$i^{13} =$_____

$i^{40} =$_____

$i^{48} =$_____

$i^{38} =$_____

$i^{14} =$_____

$i^{31} =$_____

$i^{24} =$_____

$i^{77} =$_____

22.
Write in the form $a + bi$: $-4 + i - 6i^2 + 5i^3 - 5i^4 =$_____

23.
Solve $m^2 - 3 = 0$ using complex numbers if necessary.
$m =$_____

24.
Find all complex-number solutions. Write solutions in terms of i

$x^2 = -25$

$x =$_____

25.
Solve $m^2 + 11 = 0$ using complex numbers if necessary.
$m =$_____

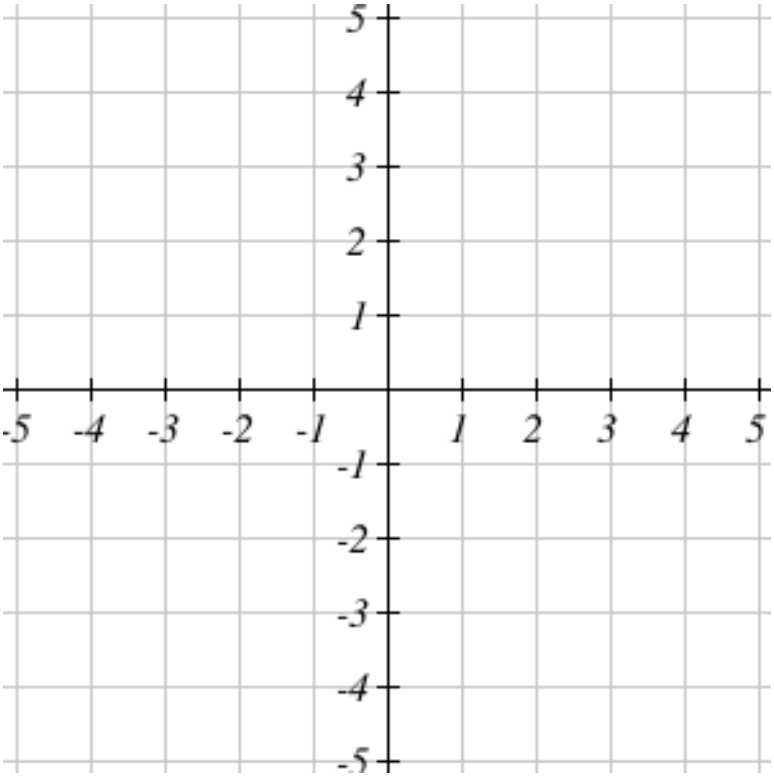
26.
Solve the equation $x^2 + 6x = -10$, using complex numbers if necessary.
$x =$_____

27.

Solve the equation: $x^2 - 8x - 3 = -73$.

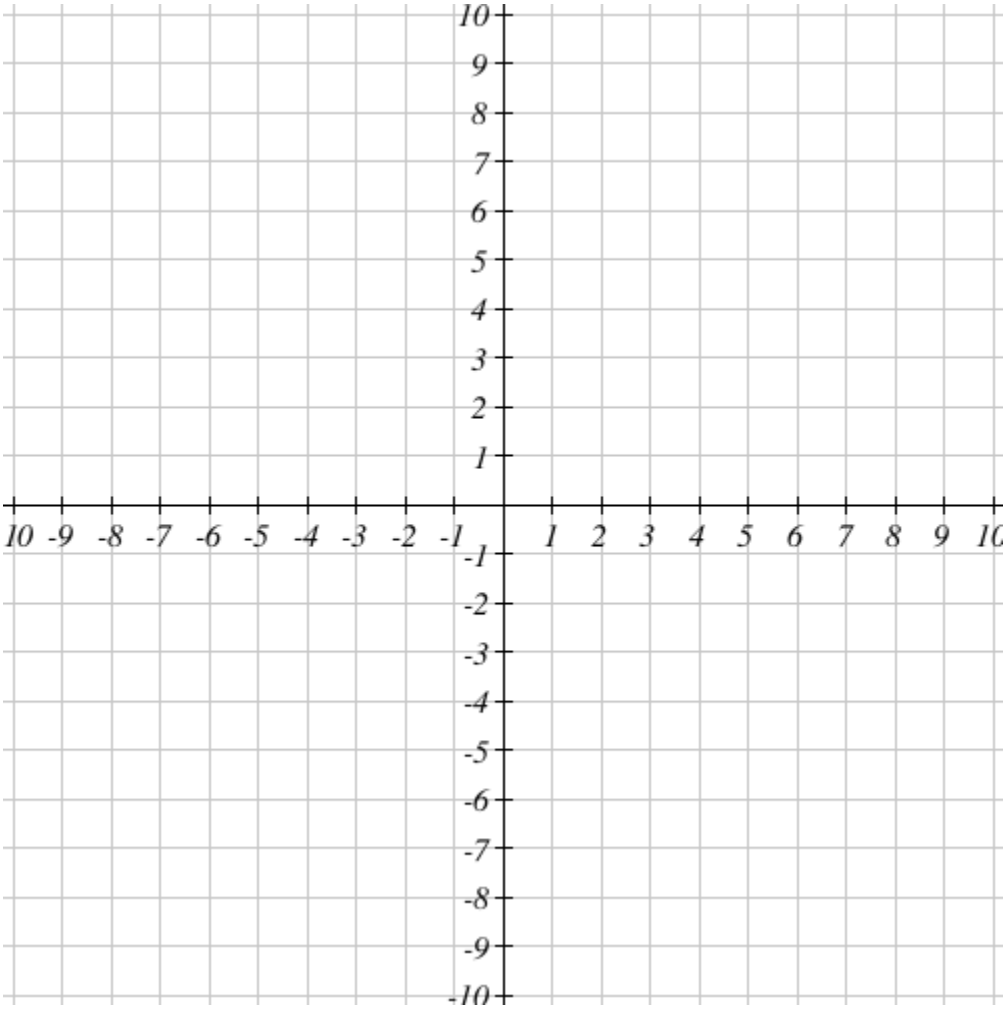
Fully simplify all answers, including non-real solutions. $x =$ _____

28.
Plot the number $-1 - 2i$.



29.

Visualize the addition of $(7 + 5i) + (-4 + i)$ by plotting the initial point, and the result.



Lecture 14

Remainder/factor theorem, Rational Zero theorem, Fundamental Theorem of Algebra, complex conjugate theorem

1.

Is $(x-5)$ a factor of $-4x^3+25x^2-19x-27$?

- No, it is a not factor.
- Yes, it is a factor.

2.

Find all zeros of the function $f(x)=9x^3-6x^2-29x+10$. Give the zeros separated by commas.
The zeros are $x=$_____

3.

Find all zeros of $f(x)=x^3-2x^2-6x+4$. Give the zeros separated by commas. Give exact value, not decimal approximations.
The zeros are $x=$_____

4.

Find all zeros of $f(x)=x^3-x^2-18x-10$. Give the zeros separated by commas. Give exact value, not decimal approximations.
The zeros are $x=$_____

5.

Find all zeros of $f(x)=x^3-5x^2+x-5$.
The zeros are $x=$_____

6.

Find all zeros of $f(x)=9x^3+27x^2+30x+12$. Give the zeros separated by commas. Give exact value, not decimal approximations.
The zeros are $x=$_____

7.

Given $P(x)=x^3+x^2+4x+4$. Write P in factored form (as a product of linear factors). Be sure to write the full equation, including $P(x)=$ _____.

8.

Given $P(x) = 3x^5 - 7x^4 + 5x^3 - 25x^2 - 28x + 12$, and that $2i$ is a zero, write P in factored form (as a product of linear factors). Be sure to write the full equation, including $P(x) =$ _____.

9.

The value of $x^3 + 9x^2 - 11x - 34$ when $x = 2$ is _____.

10.

For the cubic polynomial $f(x) = 6x^3 - 22x^2 - 80x - 24$, use the Rational Zeros Theorem to list all possible rational zeros. Then find all zeros of the polynomial.

Possible rational zeros: +/-:

- 1, 2, 3, 6, 1/2, 3/2, 1/3, 2/3, 1/4, 3/4, 1/6, 1/8, 3/8, 1/12, 1/24
- 1, 2, 3, 4, 6, 8, 12, 24, 1/2, 3/2, 1/3, 2/3, 4/3, 8/3, 1/4, 3/4, 1/6, 1/8, 3/8, 1/12, 1/24
- 1, 2, 3, 4, 6, 8, 12, 24, 1/2, 3/2, 1/3, 2/3, 1/4, 3/4, 1/6, 1/8, 3/8, 1/12, 1/24
- 1, 2, 3, 4, 6, 8, 12, 24, 1/2, 3/2, 1/3, 2/3, 4/3, 8/3, 1/6

Actual zeros of the polynomial: _____

11.

For the polynomial $g(x) = 2x^4 - 5x^3 - 39x^2 + 90x + 54$, use the Rational Zeros Theorem to list all possible rational zeros of the polynomial. Then identify all roots of the polynomial.

Possible rational roots: +/- :

- 1, 2, 3, 6, 9, 18, 27, 54, 1/2, 1/3, 2/3, 1/6, 1/9, 2/9, 1/18, 1/27, 2/27, 1/54
- 1, 2, 3, 6, 9, 18, 27, 54, 1/2, 3/2, 9/2, 27/2
- 1, 2, 1/2, 1/3, 2/3, 1/6, 1/9, 2/9, 1/18, 1/27, 2/27, 1/54
- 1, 2, 3, 6, 9, 18, 27, 54, 1/2, 3/2, 9/2, 27/2, 1/3, 2/3, 1/6, 1/9, 2/9, 1/18, 1/27, 2/27, 1/54

List all the zeros (real or complex) of the polynomial: _____

12.

For the cubic polynomial $f(x) = 6x^3 - 22x^2 - 80x - 24$, use the Rational Zeros Theorem to list all possible rational zeros. Then find all zeros of the polynomial.

Possible rational zeros: +/-

- 1, 2, 3, 4, 6, 8, 12, 24, 1/2, 3/2, 1/3, 2/3, 1/4, 3/4, 1/6, 1/8, 3/8, 1/12, 1/24
- 1, 2, 3, 4, 6, 8, 12, 24, 1/2, 3/2, 1/3, 2/3, 4/3, 8/3, 1/4, 3/4, 1/6, 1/8, 3/8, 1/12, 1/24
- 1, 2, 3, 6, 1/2, 3/2, 1/3, 2/3, 1/4, 3/4, 1/6, 1/8, 3/8, 1/12, 1/24
- 1, 2, 3, 4, 6, 8, 12, 24, 1/2, 3/2, 1/3, 2/3, 4/3, 8/3, 1/6

Actual zeros of the polynomial: _____

13.

For the polynomial $g(x) = 2x^4 - 5x^3 - 39x^2 + 90x + 54$, use the Rational Zeros Theorem to list all possible rational zeros of the polynomial. Then identify all roots of the polynomial. Possible rational roots: $\pm$ ...

- 1, 2, 3, 6, 9, 18, 27, 54, 1/2, 3/2, 9/2, 27/2
- 1, 2, 3, 6, 9, 18, 27, 54, 1/2, 3/2, 9/2, 27/2, 1/3, 2/3, 1/6, 1/9, 2/9, 1/18, 1/27, 2/27, 1/54
- 1, 2, 3, 6, 9, 18, 27, 54, 1/2, 1/3, 2/3, 1/6, 1/9, 2/9, 1/18, 1/27, 2/27, 1/54
- 1, 2, 1/2, 1/3, 2/3, 1/6, 1/9, 2/9, 1/18, 1/27, 2/27, 1/54

List all the zeros (real or complex) of the polynomial: _____

Lecture 15

Domain, Simplifying/equivalence, operations, complex fractions, negative exponent examples, finding LCD, solving equations

1.

Simplify to lowest terms, if possible: $\frac{10z^4}{45z^6}$ =_____

2.

Simplify the following expression completely.

$\frac{3z-18}{6}$ =_____

3.

Simplify the following expression completely.

$\frac{72}{8m+32}$ =_____

4.

Simplify the rational expression given below:

$$\frac{(x-12)(x-5)}{x-5}$$

The expression simplifies to _____ with the restriction that $x \neq$_____

5.

Simplify the following expression completely.

$\frac{2n+14}{n^2+13n+42}$ = _____with the restriction that $x \neq$_____

6.

Simplify

$\frac{x^2+9x+18}{x^2-9}$ =_____ with the restriction that $x \neq$_____

7.
Simplify the rational expression given below:

$$\frac{11+x}{x+11}$$

The expression simplifies to _____ with the condition that $x \neq$_____

8.
Simplify the rational expression given below:

$$\frac{15-x}{x-15}$$

The expression simplifies to _____ with the condition that $x \neq$_____

9.
Divide and simplify:

$\frac{700x^{10}}{16y^9} \div \frac{245x^5}{28y^6} =$_____

10.
Simpify:

$\frac{x^2+2x-15}{x^2-9} \cdot \frac{x^2-x-12}{x^2+7x+10} =$_____ with the restriction that $x \neq$_____

11.
Simpify:

$\frac{x^2-4x-5}{x^2-6x+5} \div \frac{x^2+5x+4}{x^2+x-2} =$_____ with the restriction $x \neq$_____

12.
Find the least common denominator of the expressions $\frac{1}{x+10}$ and $\frac{1}{x-12}$.

The least common denominator is _____

13.

Find the least common denominator of the expressions $\frac{1}{(x-2)(x-10)}$ and $\frac{1}{(x-10)(x+5)}$

The least common denominator is _____

14.

Find the least common denominator of the expressions $\frac{1}{(x+10)^9(x+8)^2}$ and $\frac{1}{(x+10)^2(x+8)^7}$

The least common denominator is_____

15.

Add:

$\frac{-1}{x+1}+\frac{-1}{x-3}=$_____

16.

Combine into a single fraction:

$\frac{8}{k-8}+\frac{5}{(k-8)^2}=$_____

17.

Combine into a single fraction:

$\frac{2x}{x^2-9}+\frac{x}{x-3}=$_____

18.

Add and simplify: $\frac{x}{x+3}+\frac{2x+15}{x^2+9x+18}=$ _____ with the restriction that $x \neq$_____

19.

What would be a good first step for solving the equation given below?

$$\frac{8}{x+7}=7$$

- Add $x+7$ to both sides
- Multiply both sides by 7
- Subtract 7 from both sides
- Multiply both sides by $x+7$
- Keep your feet shoulder-width apart, and lift with your legs, not your back

20.
Which value would you have to eliminate if it appeared as a possible solution to the equation below?

$$\frac{2}{x-18}+\frac{x-10}{17}=4$$

- 18
- 10
- 4
- 2
- 17

21.
Solve: $\frac{x+2}{3}=\frac{7}{21}$

x = _____

22.
Solve the equation $\frac{9}{x}=\frac{6}{3x}+1$.

x =_____

23.
Solve the rational equation: $-\frac{7}{s}+\frac{7}{4}=-\frac{10}{s}$

Answer: s =_____

24.
Solve the equation below:

$$\frac{x}{x+10}=\frac{1}{3}$$

x=_____

25.
Solve the rational equation: $\frac{-10t}{t^2-36}-\frac{8}{t+6}=\frac{1}{t-6}$

Answer: t = _____

26.
Solve for x.

$$\frac{x}{x+6}+\frac{7}{x-9}=\frac{-17x-12}{x^2-3x-54}$$

$x =$_____

27.
Solve for x. If there is no solution, answer DNE.

$$\frac{x}{x+7}-\frac{9}{x+3}=\frac{-16x-84}{x^2+10x+21}$$

$x =$_____

28.
Solve the equation $\frac{x+1}{x-1}=\frac{-12}{x+3}+\frac{8}{x^2+2x-3}$

- $x =$ _____
- No solution

29.
If the same number is subtracted from both the numerator and the denominator of $\frac{11}{13}$, the result is $\frac{3}{4}$. Find the number.

The number is_____

30.
John can mow a lawn in 80 minutes. Rocky can mow the same lawn in 120 minutes. How long does it take for both John and Rocky to mow the lawn if they are working together? Express your answer as a reduced fraction.

_____minutes

31.
One inlet pipe can fill an empty pool in 6 hours, and a drain can empty the pool in 10 hours. How long will it take the pipe to fill the pool if the drain is left open?

_____hours

Lecture 16

Domain, Graphical features (asymptotes, holes, zeros, end behavior), curve sketching

1.
Determine the vertical asymptotes and holes of the rational function shown below.

$$f(x) = 8\frac{(x-19)(x+29)}{(x-19)(x-48)(x+75)}$$

(a) holes? _____

(b) vertical asymptotes? _____

Answer DNE if none.

2.
Determine the vertical asymptotes and holes of the rational function shown below.

$$f(x) = \frac{(x+7)(x-10)}{(x-10)(x-6)}$$

Holes
$x =$_____

Vertical Asymptotes
$x =$_____

3.
Determine the vertical asymptotes and holes of the rational function shown below.

$$f(x) = \frac{x^2+5x+4}{x^2-5x-6}$$

If there is not a hole or asymptote, record DNE as your answer.

Holes
$x =$_____

Vertical Asymptotes
$x =$_____

4.

Let $f(x) = \frac{2x^2-9x+9}{2x^2-1x-1}$.

This function has…

1) A y-intercept at the point _____

2) x-intercepts at the point(s) _____

3) Vertical asymptotes at x = _____

5.

For each function, determine the long run behavior.

$\frac{x^2+1}{x^3+2}$ has

- No horizontal asymptote
- a Horizontal asymptote at y=0
- a Horizontal asymptote at y=1

$\frac{x^2+1}{x^2+2}$ has

- No horizontal asymptote
- a Horizontal asymptote at y=0
- a Horizontal asymptote at y=1

$\frac{x^3+1}{x^2+2}$ has

- No horizontal asymptote
- a Horizontal asymptote at y=0
- a Horizontal asymptote at y=1

6.

Find the horizontal asymptote of $f(x) = \frac{2x-x^3-3}{3x^3-2x^2-5}$.

y =_____

7.

Let $f(x) = \frac{2x^2-9x+4}{3x^2+11x+6}$.

This function has:

1) A y-intercept at the point _____

2) x-intercepts at the point(s) _____

3) Vertical asymptotes at x = _____

4) Horizontal asymptote at y =_____

8.

Write an equation for a rational function with the following properties. Assume the multiplicity of each factor is 1 or 2.

Vertical asymptotes at $x = -2$ and $x = -3$

x -intercepts at $x = 2$ and $x = -1$

y -intercept at 4

y =_____

9.

Write an equation for a rational function with following properties. Assume the multiplicity of each factor is 1 or 2.

Vertical asymptotes at $x = -4$ and $x = -1$

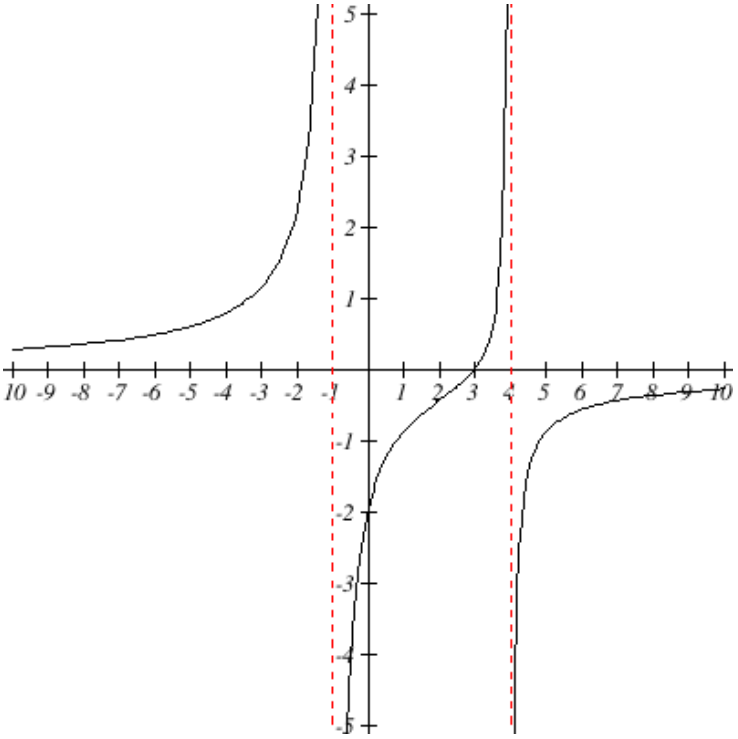
x -intercepts at $x = 6$ and $x = 2$

Horizontal asymptote at $y = 7$

y =_____

10.

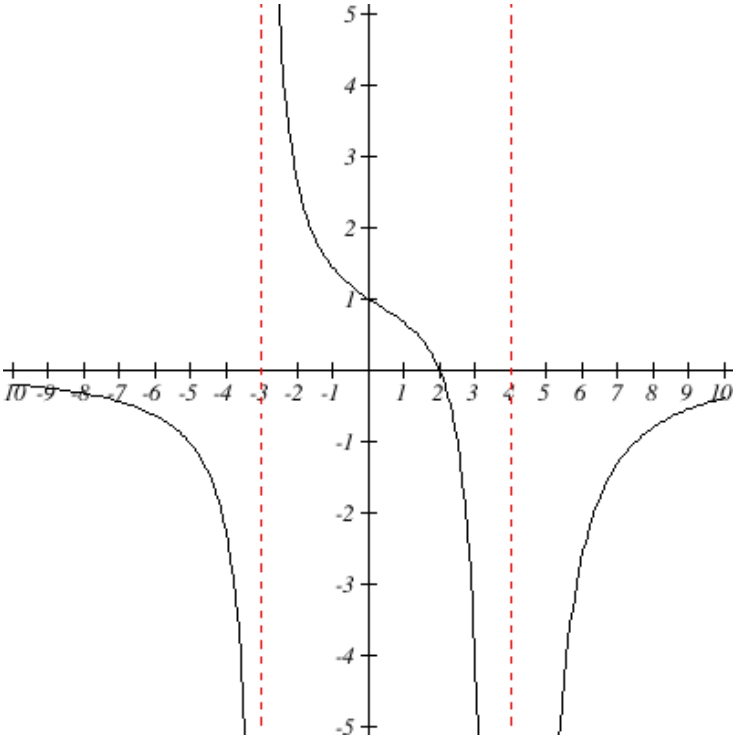
Write an equation for the function graphed below. Assume the multiplicity of each factor is 1 or 2.



$y =$_____

11.

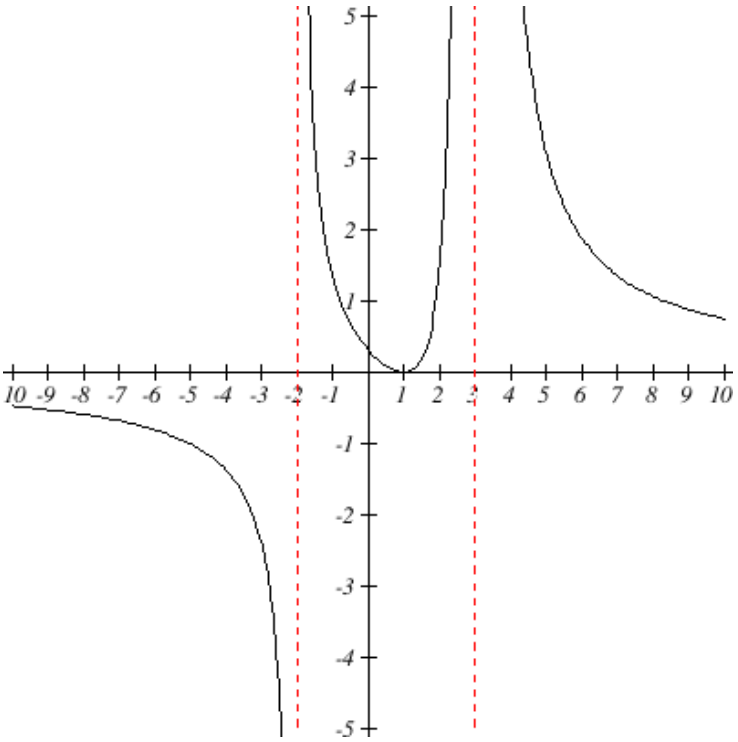
Write an equation for the function graphed below. Assume the multiplicity of each factor is 1 or 2.



$y =$_____

12.

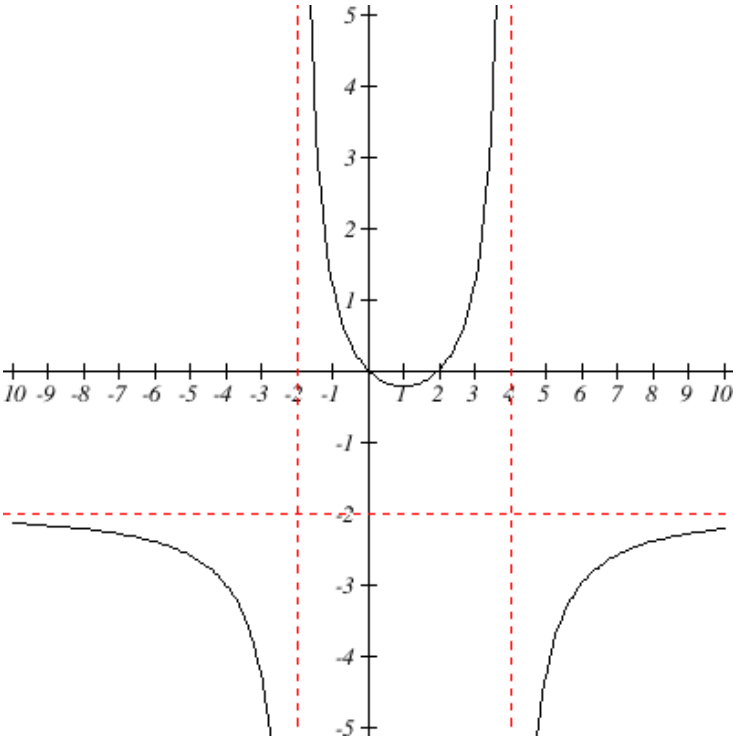
Write an equation for the function graphed below. Assume the multiplicity of each factor is 1 or 2. The y intercept is at (0,0.3)



y =_____

13.

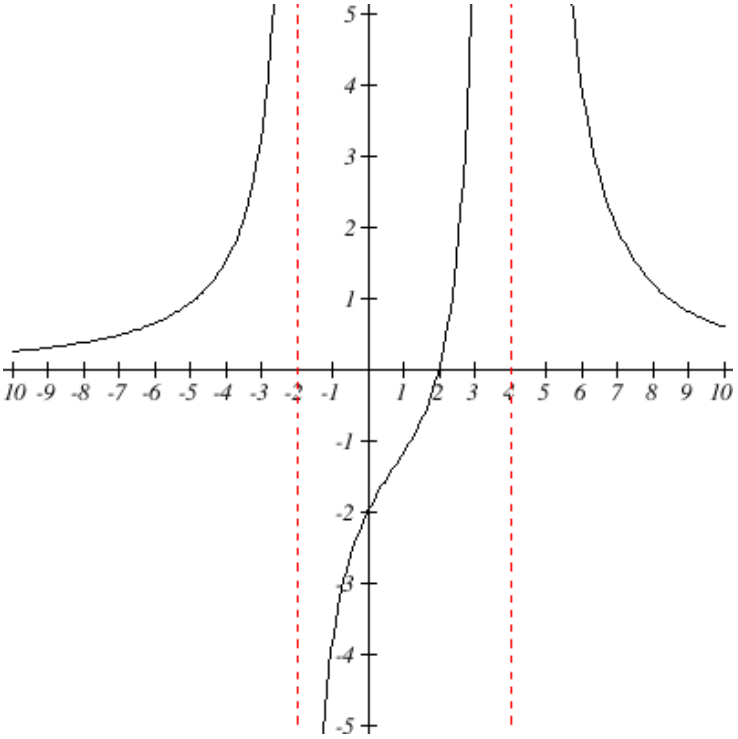
Write an equation for the function graphed below. Assume the multiplicity of each factor is 1 or 2.



y =_____

14.

Write an equation for the function graphed below. Assume the multiplicity of each factor is 1 or 2.

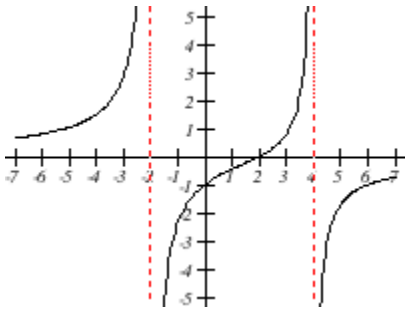
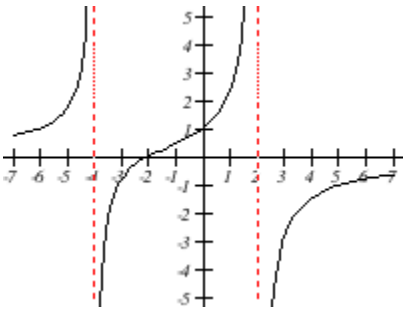
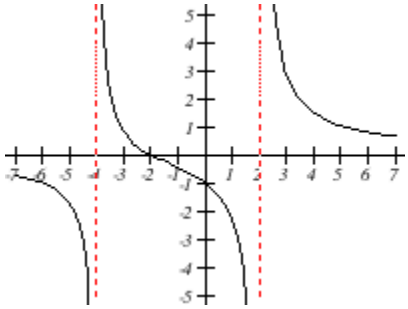
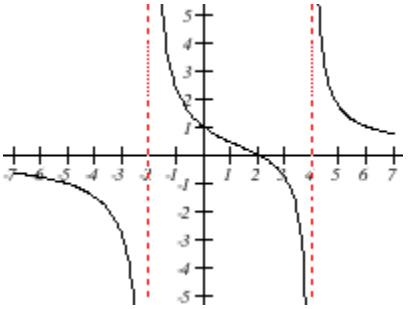


$y =$ _____

15.

Select the choice that is a graph of the function

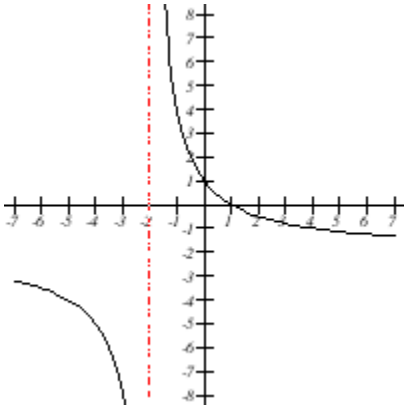
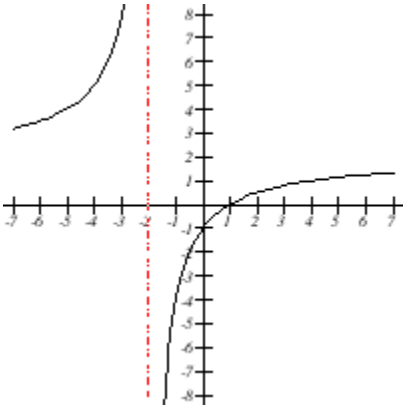
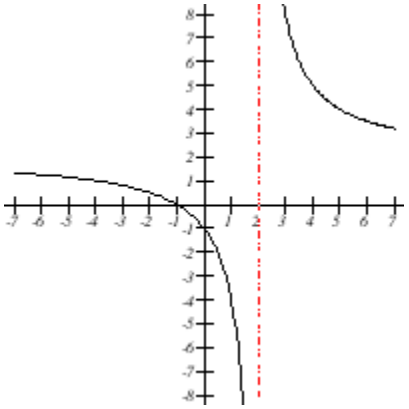
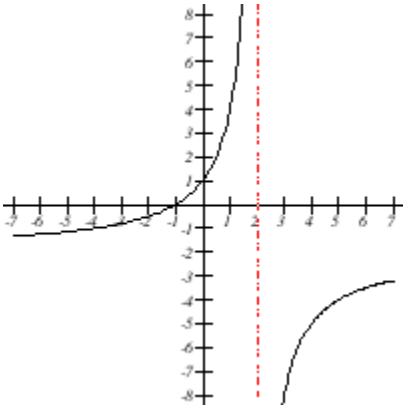
$$f(x) = -4\frac{x-2}{(x+2)(x-4)}$$

- 
- 
- 
- 

16.

Select the choice that is a graph of the function

$f(x) = 2 \cdot \dfrac{x+1}{x-2}$

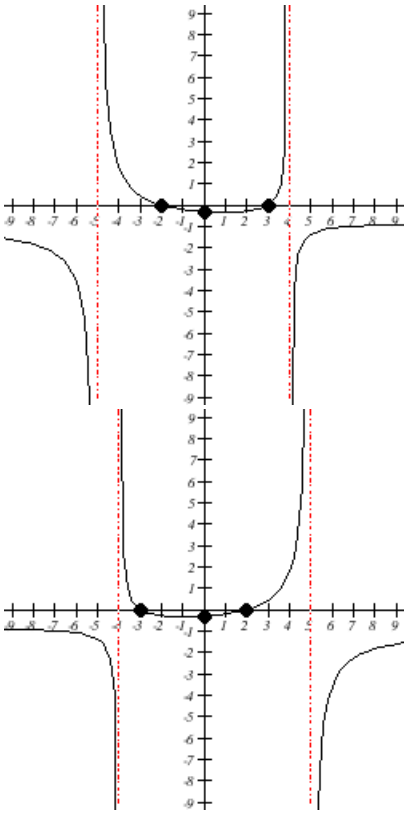
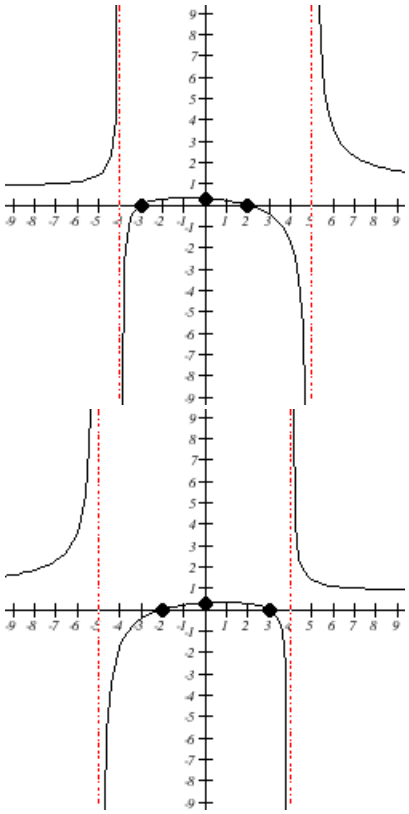
- 
- 
- 
- 

17.

Select the choice that is a graph of the function

$$f(x) = -\frac{(x+3)(x-2)}{(x+4)(x-5)}$$

Note that the graph also shows the vertical asymtotes, x-intercepts (zeros of the function), and y-intercept.

- 
- 
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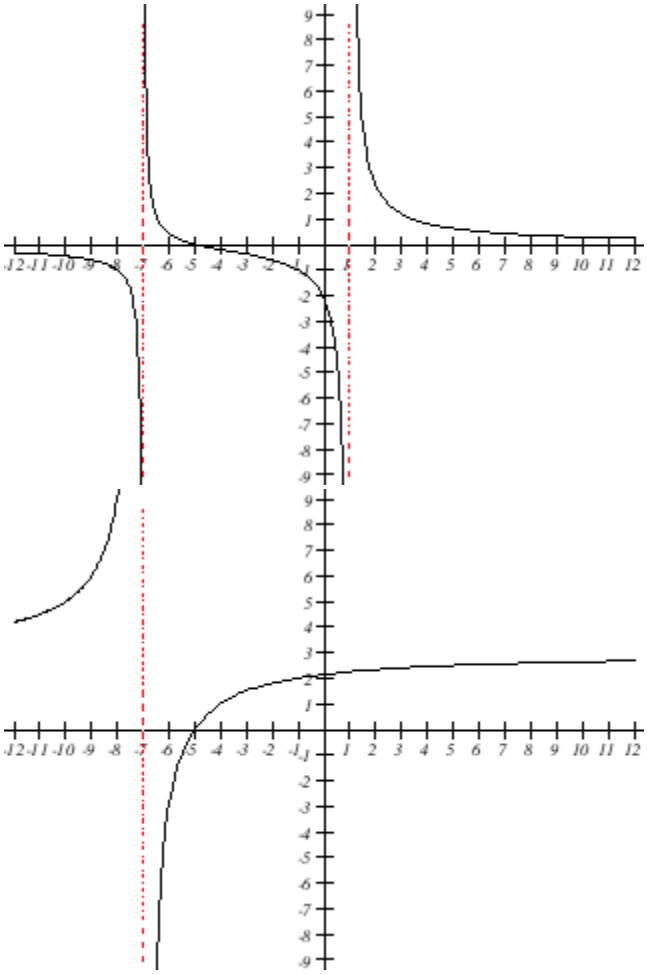
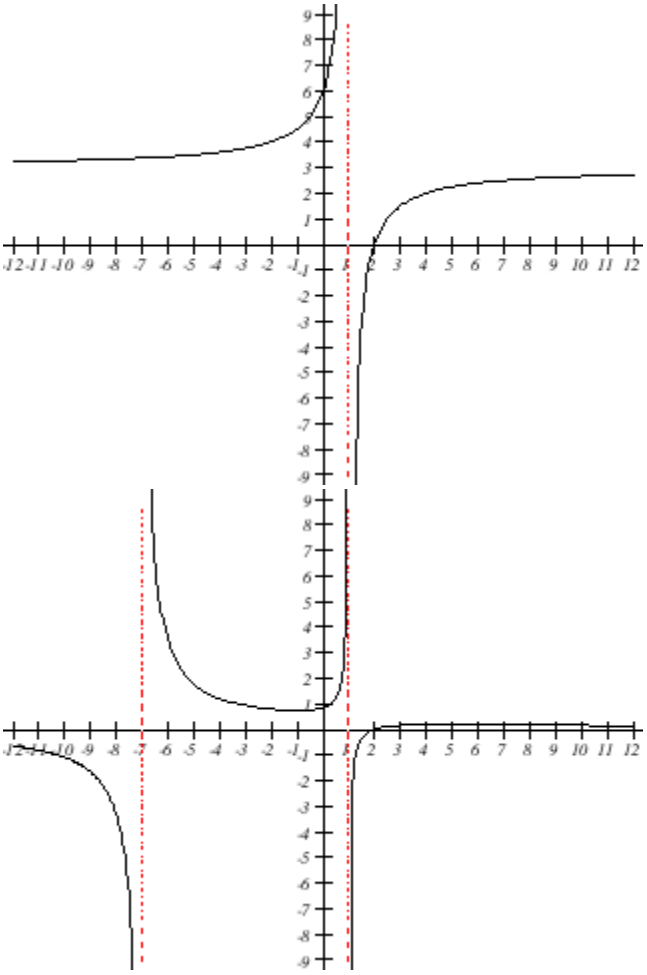
18.

Select the choice that is a graph of the function

$$f(x) = 3\frac{x+5}{(x+7)(x-1)}$$

- 
- 
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19.

Draw a graph of $f(x) = \frac{-x+4}{x-1}$, including the horizontal and vertical asymptotes, any intercepts, and an additional point on the graph.

20.

Sketch the graph of $f(x) = \frac{x^2+5x+6}{x^2-2x-8}$.

21.

Sketch the graph of $f(x) = \frac{x^2-6x+9}{x^2-2x-15}$.

22.

Sketch the graph of $f(x) = \frac{4x^2-8x+4}{x^2-6x+9}$.

23.

Sketch the graph of $f(x) = \frac{1}{(x^2-8x+16)(x^2+2x+1)}$.

24.

An ant colony resided in a once-empty home that was recently purchased and treated for pests. The population, in hundreds, of the ant colony is given by the equation $P(t) = \frac{7000t}{7t^2+600}$ for $t \geq 9$ where t is the number of hours since the pest treatment. a) Find the population of the colony at 10 hours. Round to the nearest whole number.
Populataion=_____

b) Find the population of the colony at 24 hours. Round to the nearest whole number.
Population=_____

c) Find the population of the colony at 72 hours. Round to the nearest whole number.
Population=_____

d) What value does $P(t)$ approach as time after treatment continues infinitely?
It approaches _____

e) What conclusion can you draw in regards to the ant colony's population at the newly purchased house?

- In time, the population of the ant colony increases towards an infinitely large population.
- In time, the population of the ant colony decreases to 1000.
- In time, the population of the ant colony decreases to 600.
- In time, the ant colony will no longer populate the house.

Lecture 17

Properties of inequalities, Solving linear inequalities, absolute value inequalities

1.
Which of the values below will **not** satisfy the inequality:

$2x + 9 \leq 37$

The value that will not satisfy the inequality is:

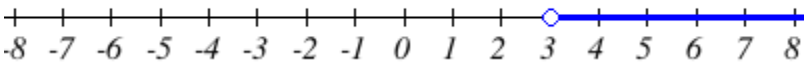
- 14
- 11
- 9
- 15
- 13

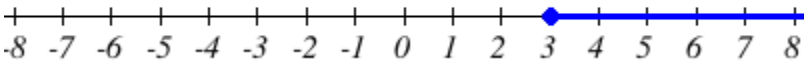
2.
Write the set given below in interval notation and select the graph of the interval.

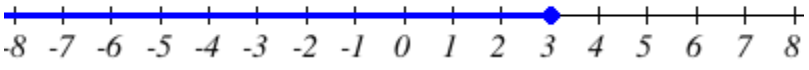
$x \leq 3$

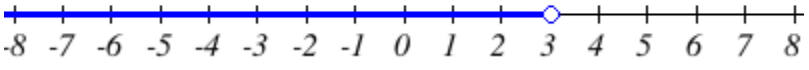
Interval notation:_____

Choose the corresponding graph:

- 

- 

- 

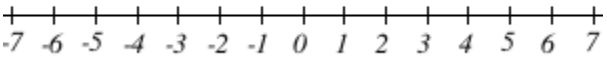
- 

3.
Express the set $-4 < x < -3$ using interval notation.
Solution: _____

4.
Solve the following inequality. Write the answer as an inequality, and graph the solution set.

$3b + 1 > 16$

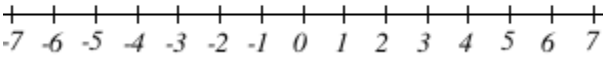
Solution: _____



5.
Solve the following inequality. Write the answer as an inequality, and graph the solution set.

$-3a + 2 \geq 2a - 3$

Solution: _____



6.
Solve: $4x + 1 > 7x + 2$

Solution: _____

7.
Solve: $-1 < 3 - 4x < 4$

Solution: _____

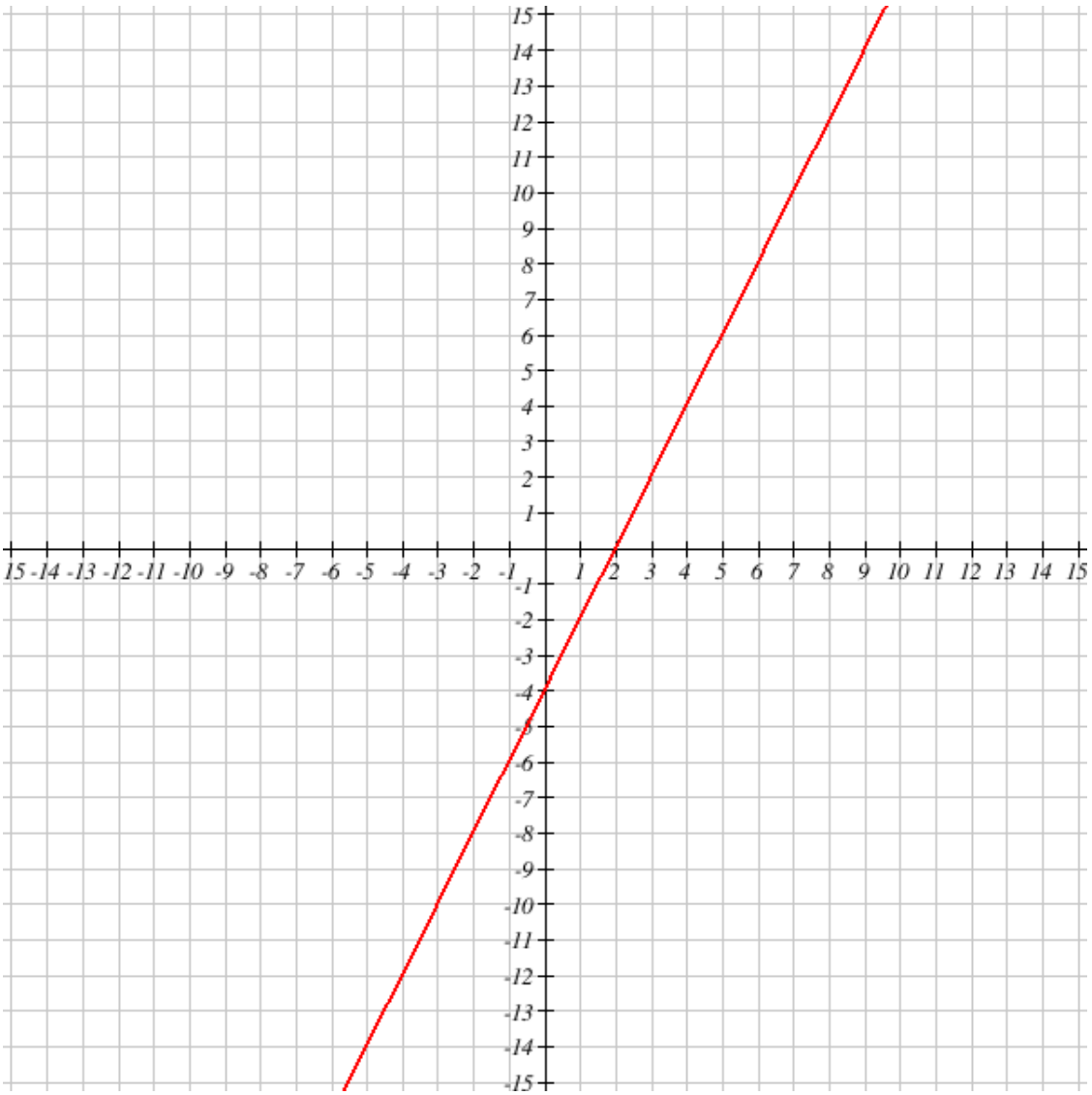
8.
Solve the inequality and write your answer in interval notation.

$-0.4 + 0.5x \leq 0.4x + 12.6$

Solution: _____

9.

Given the graph of the function $f(x)$ shown below, solve the inequalities. Express your answer as an inequality.



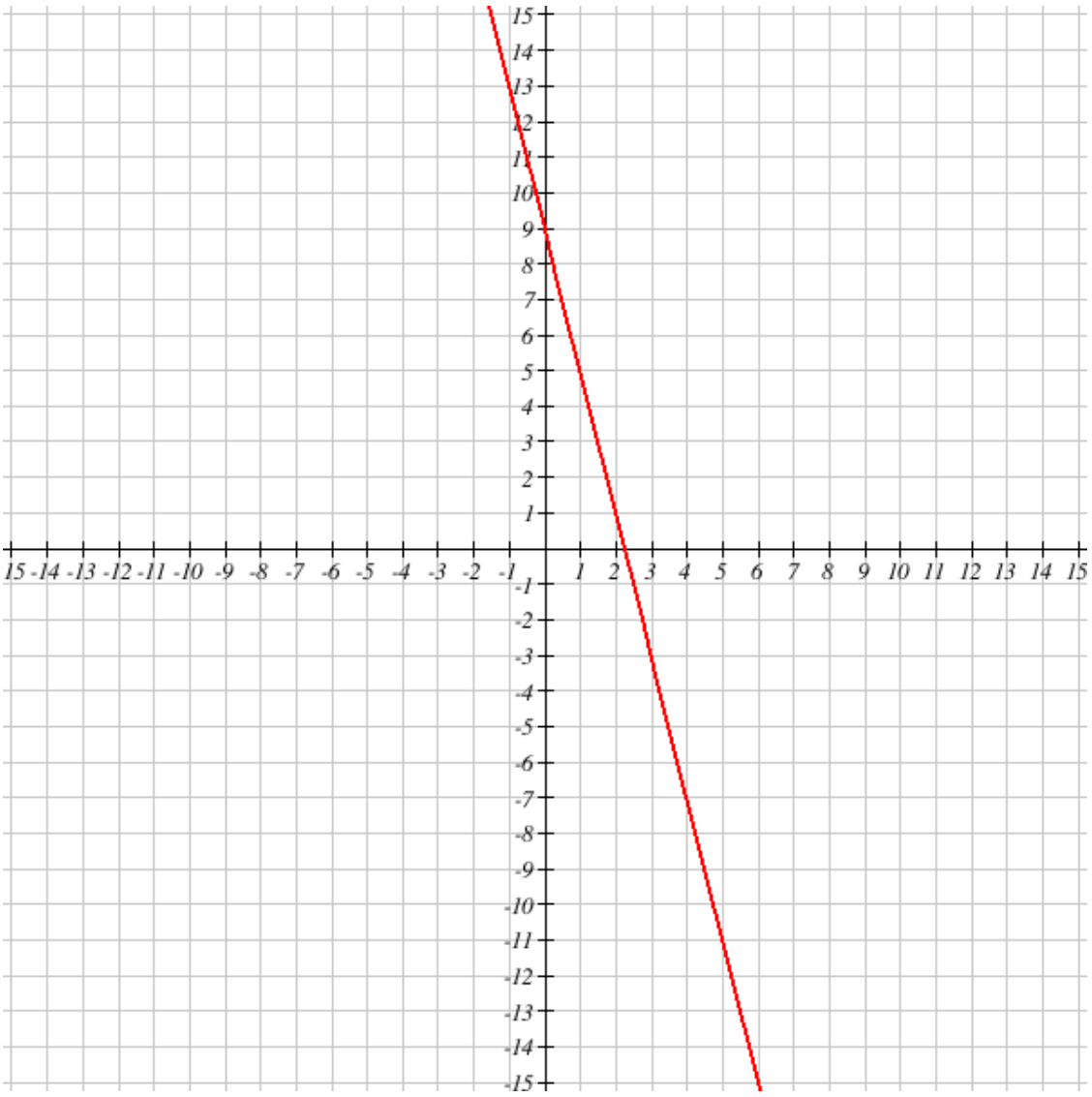
a. $f(x) > -4$ if _____

b. $f(x) < -4$ if _____

c. $f(x) = -4$ if _____

10.

Given the graph of the function f(x) shown below, solve the inequalities. Express your answer as an inequality



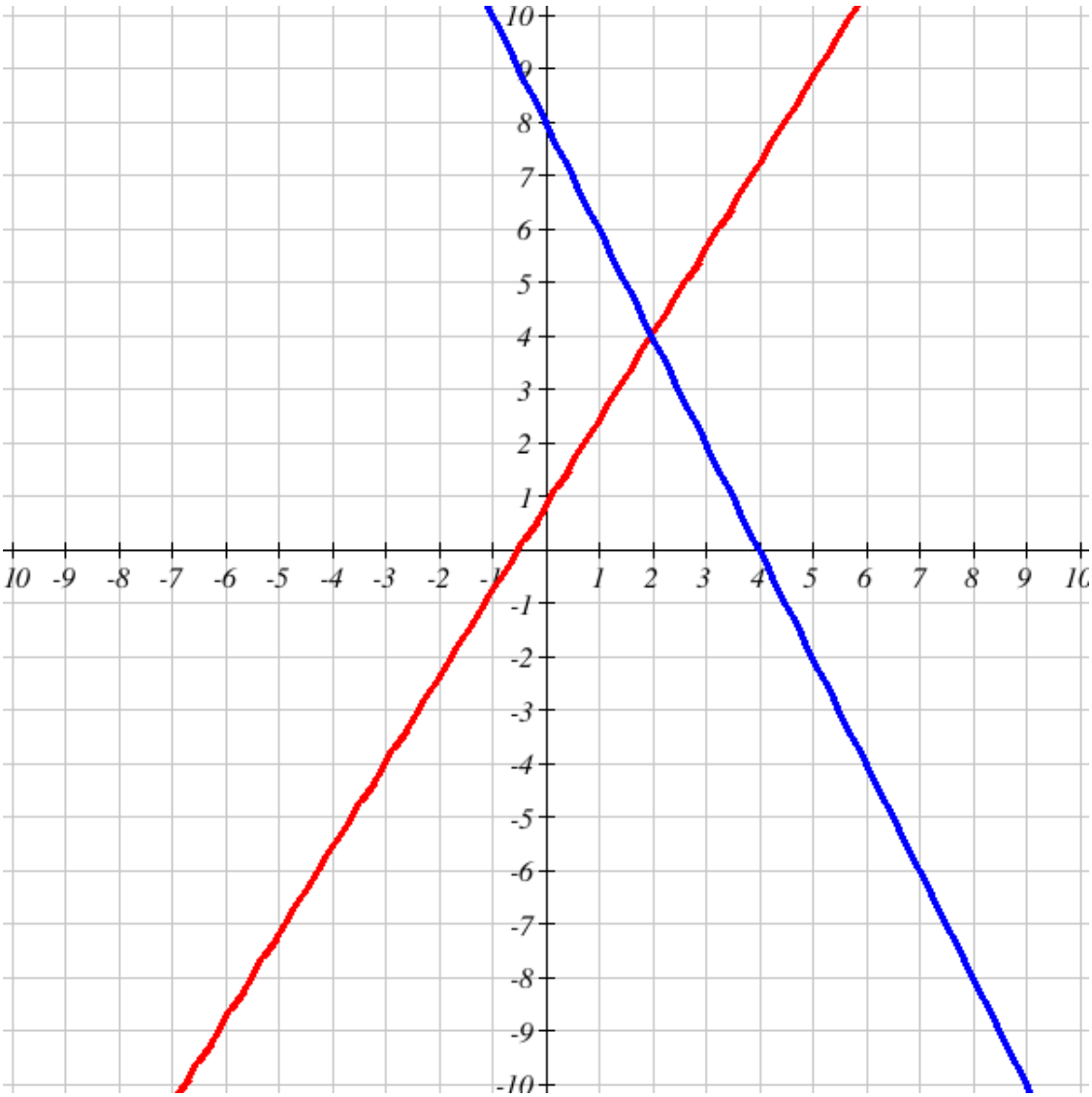
a. $f(x) > 5$ if _____

b. $f(x) < 5$ if _____

c. $f(x) = 5$ if _____

11.

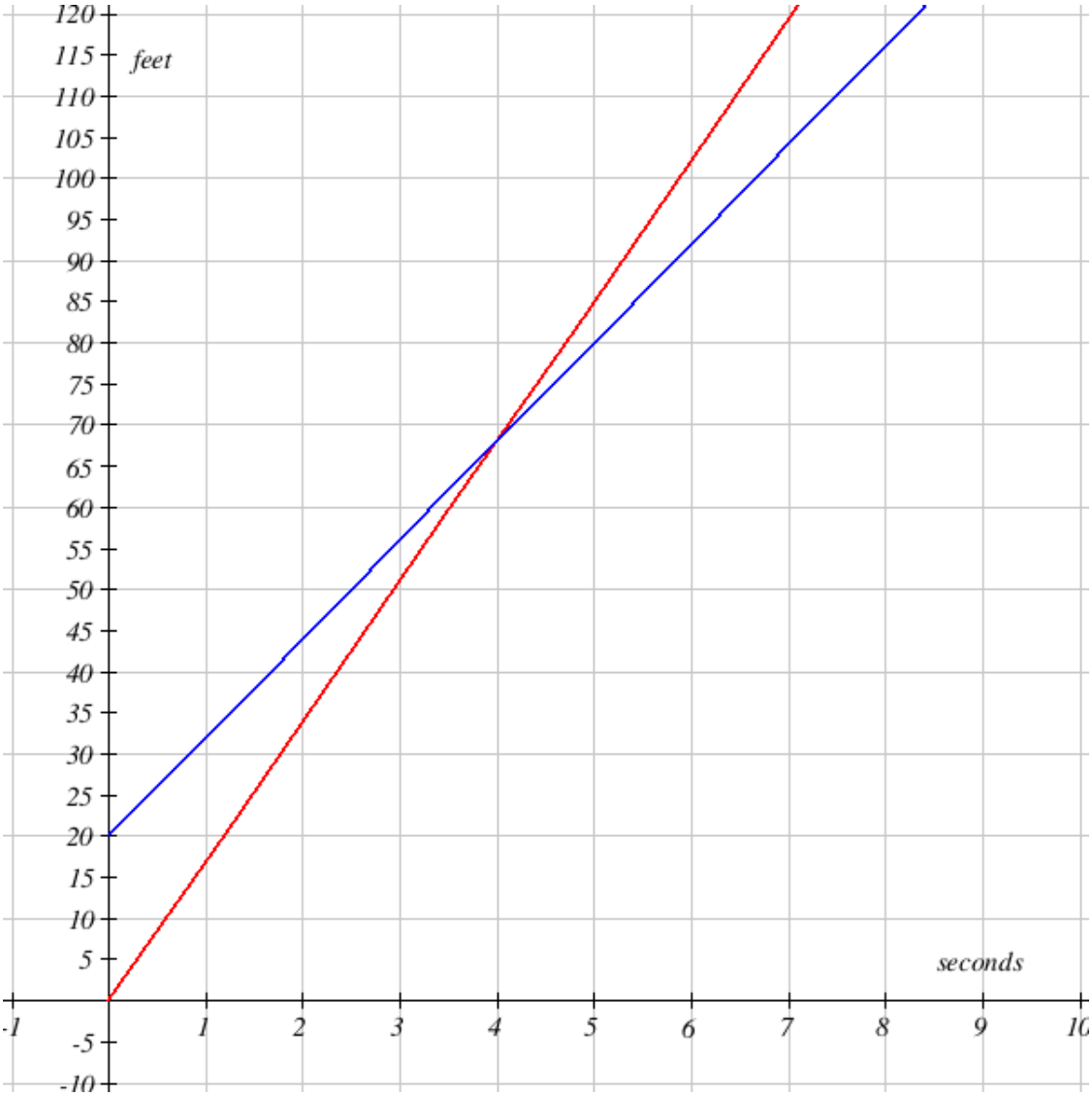
In the graph below, the red line is the graph of Y_1 and the blue line is the graph of Y_2 . Use it to solve the inequality $Y_1 > Y_2$.



Answer: _____

12.

Quinn and Kimberly are going to have a footrace. One of them decides to cheat and gets a head start on the other. The graphs below show Quinn's (blue) and Kimberly's (red) distances (in feet) from the starting line x seconds after the race begins.



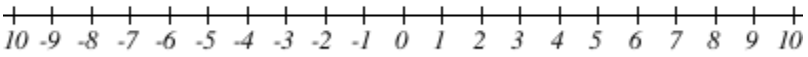
How much of a headstart did the cheater get? _____ feet

Who is the faster runner?

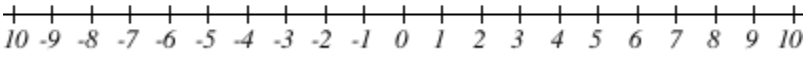
- Quinn
- Kimberly

On what interval of time was Quinn ahead of Kimberly?(Express your answer in interval notation)
Solution: _____

13.
Graph the solution to $|x| \leq 6$.



14.
Graph the solution to $|x| \geq 4$.

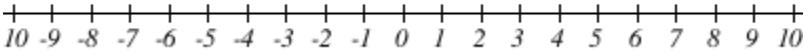


15.
Solve, and give the solution in interval notation. Answer DNE if no solution exists.

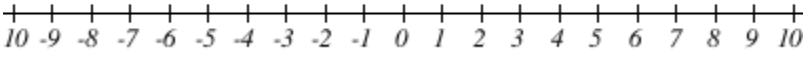
$|6x - 3| \geq 7$

The solution set is _____

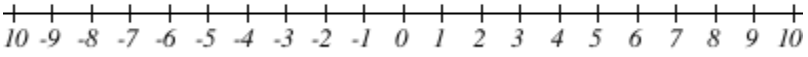
16.
Graph the solution to $|4x - 12| < 16$.



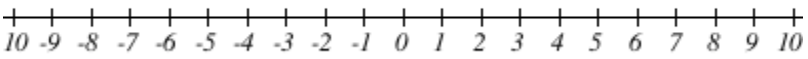
17.
Graph the solution to $|2x - 4| \leq 10$.



18.
Graph the solution to $|4x - 4| > 24$.



19.
Graph the solution to $|5x + 10| \geq 25$.



20.
Solve, and give the solution in interval notation. Answer DNE is no solution exists.

$10|6b + 9| + 5 \leq 75$

The solution is _____

21.
Solve, and give the solution in interval notation. Answer DNE if no solution exists.

$9|8x - 3| + 4 \geq 85$

The solution is _____

22.
Solve, and give the solution in interval notation. Answer DNE if no solution exists.

$7|7b - 8| + 16 \leq 9$

The solution is _____

23.
Solve, and give the solution in interval notation. Answer DNE if no solution exists.

$21|9x + 2| + 30 \geq 9$

The solution is _____

Lecture 18

Solving polynomial and rational inequalities, key numbers, number line analysis

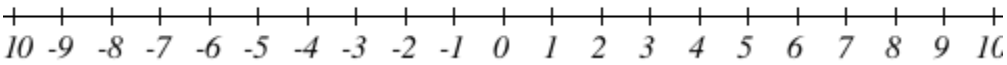
1.

Solve the following inequality and graph the solution:

$(x + 6)(x - 4) > 0$

Write the solution as a compound inequality: _____

And draw the solution



2.

Solve the following quadratic inequality: $x^2 - 7x + 12 \geq 0$

Write your answer in interval notation: _____

3.

Solve the following quadratic inequality: $x^2 + 3x - 18 > 0$

Write your answer in interval notation: _____

4.

Solve the following quadratic inequality: $3x^2 + 5x - 2 > 0$

Write your answer in interval notation: _____

5.

Solve the inequality: $r^2 > -r - 12$

Give your answer in interval notation. Answer DNE if there is no solution.

Solution: _____

6.

Solve the inequality and write the solution in interval notation. Leave answers in exact, simplified form.

$2x^2 + 4 \leq 8x$

Solution: _____

7.

Solve the polynomial inequality: $4(x-6)(x+5)(x+4) < 0$

Give your answer in interval notation. Answer DNE if there is no solution.
Solution: _____

8.

Solve the inequality: $r^2 \leq r + 72$

Give your answer in interval notation. Answer DNE if there is no solution.

Solution: _____

9.

Solve the polynomial inequality: $x^3(x-3)^2(x+7) \geq 0$

Solution: _____

10.

Solve the polynomial inequality: $(x-4)(x+5)(x-2)^2 < 0$

State your answer using interval notation.
Solution: _____

11.

Solve the following inequality: $x^4 - 20x^2 + 64 > 0$

Write your answer in interval notation.

Solution: _____

12.

Solve the inequality $\frac{x+9}{x+8} < 3$

Give your answer in interval notation.

Solution: _____

13.

Solve the given inequality. Present your answer in interval notation.

$$\frac{-6x+7}{7x-1} \leq 0$$

Solution: _____

14.

Solve the given inequality. Present your solution in interval notation.

$$\frac{-7x-1}{x-6} \leq -\frac{20}{9}$$

Solution: _____

15.

Solve the inequality $\frac{1}{x+1} < 2$

Give your answer in interval notation.

Solution: _____

16.

Solve the following rational inequality $\frac{x-3}{x^2-49} > 0$.

State your answer using interval notation.

Solution: _____

17.

Solve the following rational inequality $\frac{x-4}{x^2-36} < 0$.

Give your answer using interval notation.

Solution: _____

18.

Solve the following inequality: $\frac{x^2-7x+12}{x^2+10x+25} \geq 0$

Give you answer using interval notation.

Solution: _____

19.

Solve the rational inequality. Write your answer in interval notation.

$$\frac{3x}{7-x} < x$$

Solution: _____

20.

Solve the rational inequality. Write your answer in interval notation.

$$\frac{4x}{3-x} \geq 4x$$

Solution: _____

21.

Solve the rational inequality. Write your answer in interval notation.

$$\frac{8}{x-3} > \frac{6}{x-1}$$

Solution: _____

22.

Solve the rational inequality. Write your answer in interval notation.

$$\frac{(x+12)(x-4)}{x-1} \geq 0$$

Solution: _____

Lecture 19

Linear systems and solving techniques, nonlinear systems and solving

1.
Which of these is the definition of solution for a system of equations?

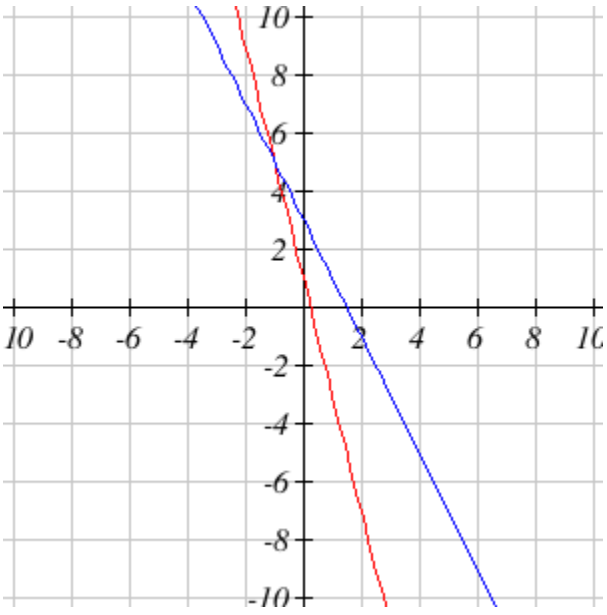
- A value for the variable that makes the equation true.
- Where they intersect.
- An ordered pair that makes both equations true.
- The answer.

2.
Consider the following system of equations:

$$\begin{cases} -2x - 4y &= -40 \\ -6x - 5y &= -64 \end{cases}$$

True or False: The point (4,8) is a solution of the system.

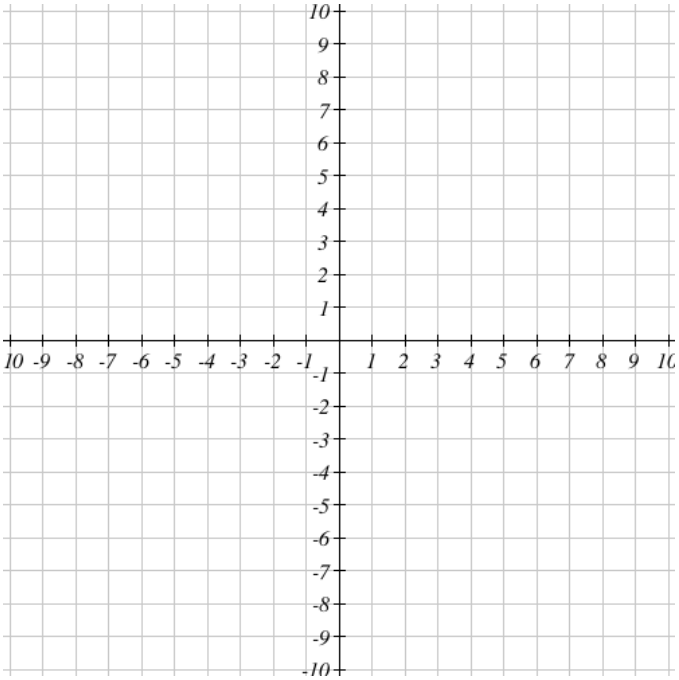
3.
Consider the following graph of a system of equations:



What is the solution of the system? _____

4.
Solve the system of equations by graphing: $\begin{cases} y = -2x + 8 \\ y = 2x + 4 \end{cases}$

First graph each line, then write the solution to the system.

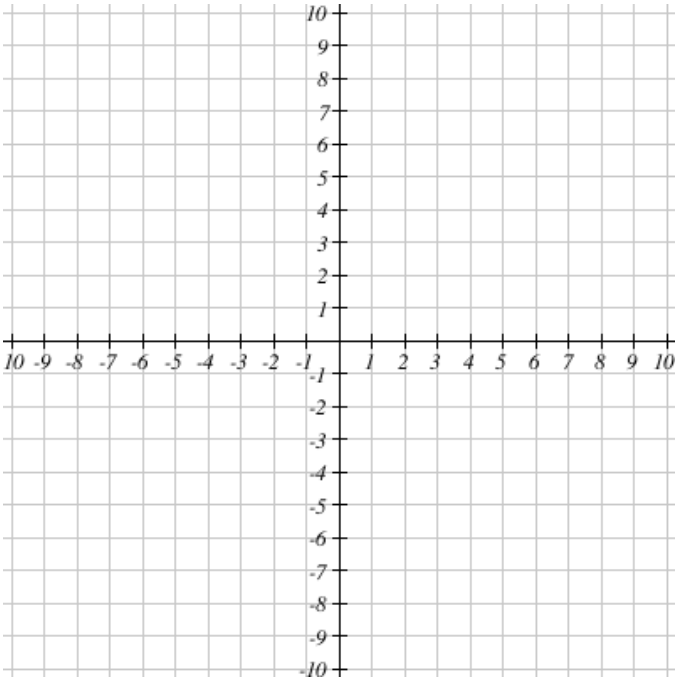


The solution to the system is _____

5.

Solve the system of equations by graphing the equations:

$\begin{cases} y = 3 \\ x = -7 \end{cases}$

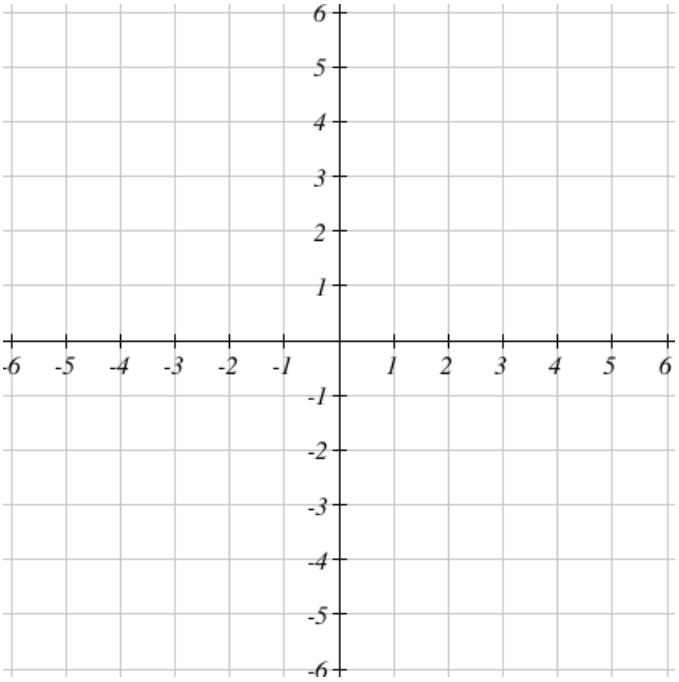


The solution to the system is _____

6.

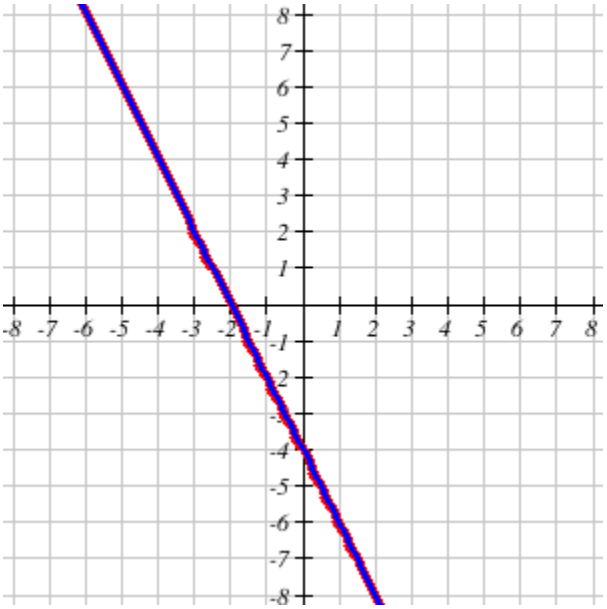
Solve the system of equations by graphing:

$\begin{cases} 2x + y = -4 \\ 3x + 6y = 12 \end{cases}$



The solution is _____

7.



1) How many solutions does the system graphed above have?

- No solutions.
- An infinite number of solutions.
- One solution.

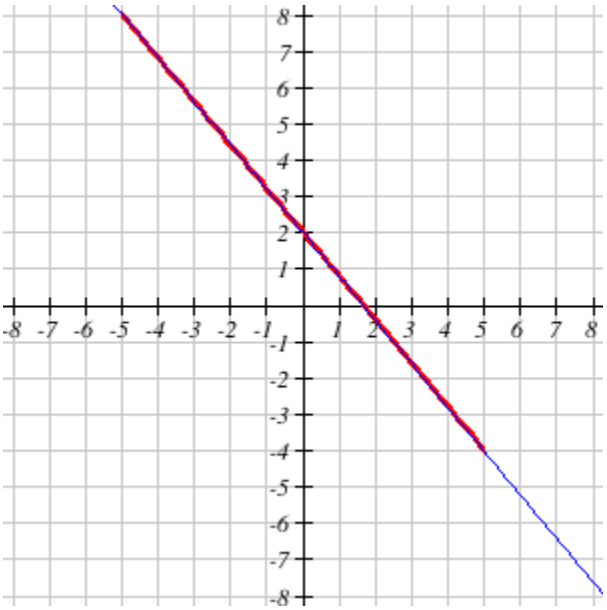
2) Is this system consistent or inconsistent?

- This is a consistent system.
- This is an inconsistent system.

3) Are the equations in this system independent, dependent, or neither?

- The equations are dependent.
- The equations are independent.
- The equations are neither independent nor dependent.

8.



For the system red and blue lines above,
there are...

- no solutions.
- an infinite number of solutions.

9.

Convert the equations in the system below into slope-intercept form and then classify the system.

$4 \cdot x + y = -4$
$8 \cdot x + 2 \cdot y = -8$

In slope-intercept form, the first equation is y = _____
In slope-intercept form, the second equation is y= _____

The system is...

- Inconsistent
- Consistent-dependent
- Consistent and Independent

10.
Solve the system by substitution. Give coordinates as integers or reduced fractions.

$$\begin{cases} -4x - 7y = -37 \\ y = -6x + 27 \end{cases}$$

- One or more solutions: _____
- No solution
- Infinite number of solutions

11.
Solve the following system of equations with the substitution method:

$$\begin{cases} x + y = -8 \\ y = 3x \end{cases}$$

Answer: $(x, y) =$ (_____ , _____)

Give your answers as integers or as reduced fractions.

12.
Find the point at which the line $f(x) = -5x - 2$ intersects the line $k(x) = -1x - 2$

$(x, y) =$ (_____ , _____)

Give coordinates as integers or reduced fractions.

13.
Solve the system using substitution.

$$\begin{cases} -5x + 5y = 35 \\ -7x + y = 31 \end{cases}$$

- One solution: _____
- No solution
- Infinite number of solutions

14.
Find the point at which the line $f(x) = -2.7x - 12.24$ intersects the line $g(x) = 4.3x + 10.16$.

Write the values of x and y in decimal form.

$(x, y) =$ (_____, _____)

15.
Solve the given linear system of equations:

$$\begin{cases} 6x - 9y = 12 \\ -8x + 12y = -16 \end{cases}$$

- One solution: _____
- No solution
- Infinite number of solutions

16.
Solve the system with the addition method:

$$\begin{cases} 8x - 10y = 28 \\ x - 3y = 0 \end{cases}$$

- One solution: _____
- No solution
- Infinite number of solutions

17.
Solve the system by elimination.

$$\begin{cases} 4x - 3y = 20 \\ -5x + 2y = -25 \end{cases}$$

- One solution: _____
- No solution
- Infinite number of solutions

18.
Solve by Elimination/Addition

$$\begin{cases} -2x + 8y = 28 \\ -3x + 12y = 40 \end{cases}$$

- One solution: _____
- No solution
- Infinite number of solutions

19.
Aaron is 2 years older than Diana. In 6 years the sum of their ages will be 40 . How old is Aaron now?

_____ years old

20.
The admission fee at an amusement park is $2.25 for children and $6.80 for adults. On a certain day, 364 people entered the park, and the admission fees collected totaled $1729 . How many children and how many adults were admitted?

There were _____ children admitted.
There were _____ adults admitted

21.
Diana puts x dollars into an investment with an interest rate of 6 percent per year and y dollars into an investment with an interest rate of 9 percent per year. She invests a total of $8200, and her interest earnings after one year are $600. From this information, we can create two equations: one for the total investment and one for the interest earned. State both equations, and then solve the system to determine how much Diana invested in each.

The equation that describes the total investment is _____

The equation that describes the interest earned is _____

Amount invested at 6 percent interest is $_____

Amount invested at 9 percent interest is $_____

22.

A jar contain 800 coins, each of which is gold or silver. A gold coin is valued at \$8.00 while a silver coin is valued at \$4.00 . The total value in the jar is \$5000 . Which of the following can be used to model the information if x represents the number of gold coins and y represents the number of silver coins?

- $\begin{cases} x + y = 5000 \\ 8x + 4y = 800 \end{cases}$
- $\begin{cases} 8x + 4y = 800 \\ 8x + y = 5000 \end{cases}$
- $\begin{cases} x + y = 800 \\ 4x + 8y = 5000 \end{cases}$
- $\begin{cases} x + y = 800 \\ 8x + 4y = 5000 \end{cases}$
- $\begin{cases} x - y = 800 \\ 4x + 8y = 4800 \end{cases}$

23.

A man has 14 coins in his pocket, all of which are dimes (worth \$0.10 each) and quarters (worth \$0.25 each). If the total value of his change is \$2.15 , how many dimes and how many quarters does he have?
He has _____ dimes.
He has _____ quarters.

24.

Carlos needs to produce 2000 milliliters of 50% alcohol solution. At his disposal he has 20% alcohol solution and 60% alcohol solution. How much of each does he need in order to produce his desired solution?

He needs _____ milliliters of 20% solution.
He needs _____ milliliters of 60% solution

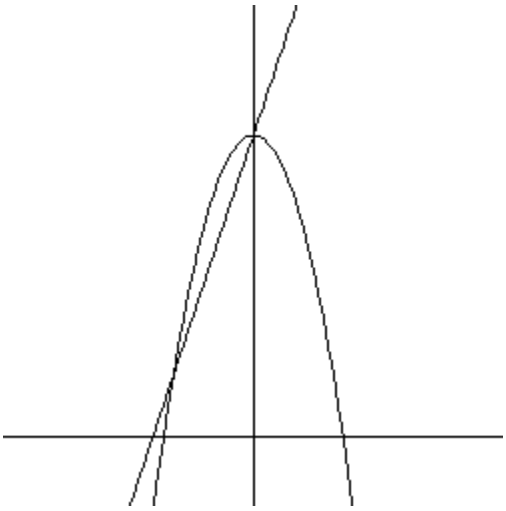
25.

Use the elimination method to find all solutions of the system:

$\begin{cases} x^2 + y^2 = 5 \\ x^2 - y^2 = 1 \end{cases}$

The four solutions of the system are: _____

26.
Find the solutions to the system of nonlinear equations given by:
$\begin{cases} y = 2x + 5 \\ y = -x^2 + 5 \end{cases}$



Enter your answer as a list of ordered pairs. Solution: _____

27.
Use the elimination method to find all solutions of the system:

$\begin{cases} x^2 - 2y = 22 \\ x^2 + 5y = 1 \end{cases}$

The two solutions to the system are: _____

28.
Use the elimination method to find all solutions of the system:

$\begin{cases} 3x^2 - y^2 = 11 \\ x^2 + 4y^2 = 8 \end{cases}$

The four solutions of the system are: $(-a, -b), (-a, b), (a, -b)$, and (a, b) .

Using positive numbers find:
$a =$ _____ and $b =$_____ .

29.
Find all solutions of the system:

$$\begin{cases} y = 1 - x^2 \\ y = x^2 - 1 \end{cases}$$

The two solutions of the system are: _____

30.
Use the substitution method to find all solutions of the system:

$$\begin{cases} y = x - 2 \\ xy = 3 \end{cases}$$

The solutions of the system are:

$x_1 =$ _____, $y_1 =$_____ and
$x_2 =$_____ , $y_2 =$_____

31.
A rectangle has an area of 150 cm^2 and a perimeter of 50 cm, and its length is longer than its width.

What are its dimensions?

Its length is _____ cm
Its width is _____ cm.

32.
Construct a consistent and independent system of equations that has $(4,7)$ as its solution. Use x and y as your variables, and put your equations in the form $Ax + By = C$ with $A \neq 0$ and $B \neq 0$. Note that there are many possible correct answers.