Final Exam Review – College Algebra Redesign

Formulas to know: (make some flash cards if you need to)

1) If $f(x) = ax^2 + bc + c$ The x-coordinate of the vertex (max or min) is: $x = \frac{-b}{2a}$ (plug in x to get the y coordinate)

2) To solve $ax^2 + bc + c = 0$, if it doesn't factor, use the quadratic formula: $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

3) If you want to get a decimal approximation for a logarithm that is not base 10 or base e, use the change of base formula: $lob_b x = \frac{logx}{logb}$

4) Know: 12 inches= 1ft, 1 yard = 3feet, 16 oz = 1 pound, 1m=1000 mm, 1 m =100 cm, 1 km = 1000 m (same for g,L)

5) Line equations: a) Slope = $\frac{y_2-y_1}{x_2-x_1}$ 2) Point slope form: $y - y_1 = m(x - x_1)$ 3) slope-intercept form: y=mx+b

6) Revenue=how much money brining in, cost = how much spending, profit = revenue – cost (P=R-C); Break-even point is when revenue=cost.

7) Converting between exponential and logarithm forms: $log_b x = y \quad is\ equivalent\ to \quad b^y = x$

8) Know the formulas for area of a triangle A=1/2*b*h and area of a rectangle/square: A = L*W

You might consider other things "formulas" as you study for the final. So, add to the list above as you see fit.

To study: Rework your 4 past exams and the Fall 2024 and Spring 2025 finals. If you need extra practice with particular things, go through the topics below and check your answers at the end of this packet.

Review by topic with practice:

Topic 1: Domain

- The domain of polynomials is all real numbers (-infinity, infinity). Example

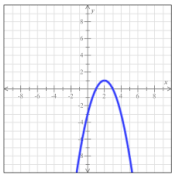
  Line 2x + 3y= 7, quadratic $y=2x^2+4x+3$, other higher order polynomials: $y=2x^4-5x+3$

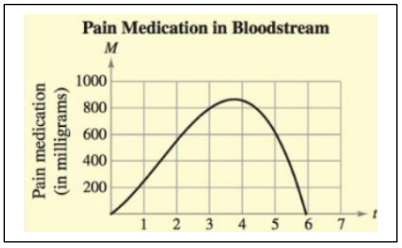
- The domain of radicals (remember you cannot take the even root of a negative), so for $\sqrt[n]{f(x)}$, if n is even, then the domain is whatever x makes $f(x) \geq 0$.
- The domain of rational (fractional functions) is all values of x except those that make the denominator =0 because we cannot divide by 0.
- To find the domain if you are given the graph instead of the function, look what x values are covered by the graph. Always write interval notation as smaller, larger. Use brackets if the endpoint is included. Otherwise, use parentheses.
- For application problems, you might need to adjust the domain based on what makes sense for inputs.

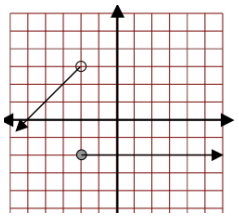
Topic 1 practice: Find the domain in interval notation:

State the domain (in interval notation):

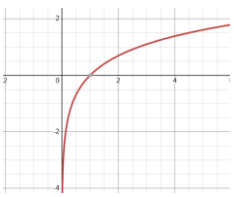
a) $f(t) = \sqrt{7t+5}$ b) $y = 2x^3 - 6x + 1$ c) $f(x) = \frac{5x}{x+7}$ d) $y = \frac{5}{\sqrt{x-1}}$

e) 

f) 

g) 

h) y=ln(x) (graph below



Topic 2: Lines and linear functions

- A function that is a line has a constant rate of change, or slope (increases or decreases by the same amount each time period. The formulas that you need to memorize are listed at the beginning of this document.
- If asked for the equation of a non-vertical or non-horizontal line, you should only have x and y left in your equation. If you know the slope and y-intercept, use y=mx+b to write the equation. Otherwise, use $y-y_1=m(x-x_1)$
- A vertical line is in x=# form and has an undefined slope. A horizontal line is in y=# form and has a 0 slope.

Topic 2 practice:

1) Set up an equation, but you do not need to solve.

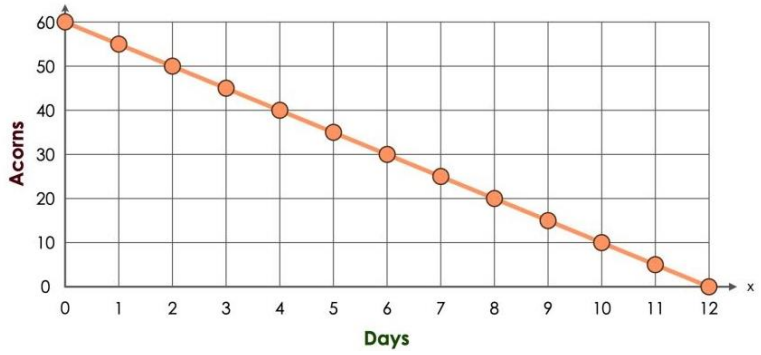
a) The cost to repair a computer was combined of parts and labor. The cost for parts was $44, and the labor charge was $45 per hour. What is the total cost for x hours?

b) The Elk Grove Bowling Alley offers a special. Each game costs $2.50, and shoe rental $3, what is the cost for t games?

c) The sum of the measures of the angles of all triangles is 180˚. Two angles are equal and the third angle is 5 more than twice the measure of the other two. Write the equation for the sum of the angles in one variable (do not solve).

d) John and Saniya worked the fair one day. If Saniya made 4/5 of what John made, write an expression in one variable that gives the total amount, T, made for the two that day. Define your variable.

2) Below is the graph of y=f(x)



a) What is the slope? Include units.
b) Explain what the y-intercept represents.
c) Use the graph to find f(10). Include units.
d) Use the graph to find where f(x)=20. Include units.
e) What is the domain in relation to this application problem?
f) What is the range in relation to this application problem?
g) Write an equation for the function that gives the number acorns left after x days.
h) Use the equation from g) to find f(10). Is that the same answer you found in part c)?
i) Use the function to find where f(x)=20. Is that the same value you found in part d)? Show work algebraically.

3) Fill in the chart to make it a linear function:

x	y
5	10
8	
11	18
14	

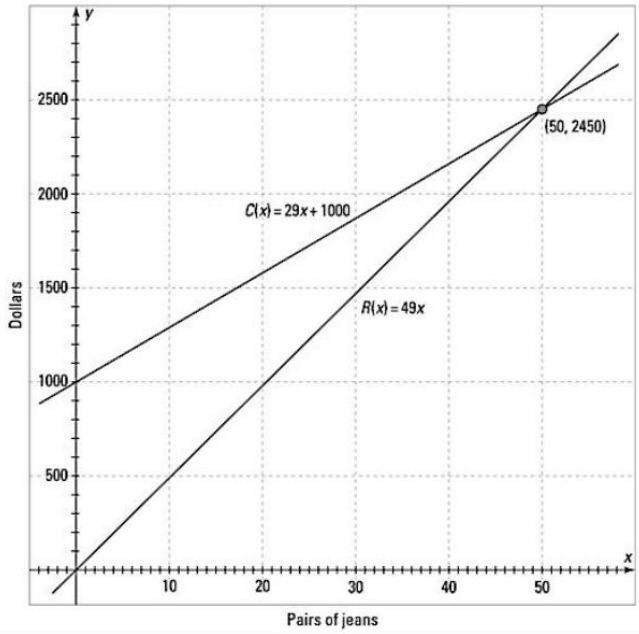
4) a) Find the x and y-intercepts and graph: $3x - 7y = 9$ b) Solve for y and state the slope and y-intercept.

5) Graph the following and state the slope: a) y=-3 b) x = 4 c) $y = -\frac{1}{3}x + 4$

6) Find the equation of the line:
   a) With a slope of 7 and a y-intercept at (0,-2)
   b) Through the points (-2,3) and (-3, 7). Write both point-slope and then solve for y.
   c) With a rate of change of -1/2 and y=3 when x=5. Write both point slope and then solve for y.

7) You decide to sell caramel apples at a park. Your cost for the caramel apple is $1.35 plus the weekly booth rental of $180. You plan to sell them $3.13 each.
a) What is your cost for x apples?
b) What is the revenue from sale of x apples?
c) What is the breakeven point (no profit)? Explain what this represents.

8) Use the graph to answer the following.
a) State the break even point and explain what it means. Include units in explanation.
b) For what value(s) of x is cost more than revenue?
c) Write the Profit function.
d) Find P(80) and state what it means.
e) What is the slope of the cost function? Include units.
f) What is the marginal revenue? Include units and state what it represents.

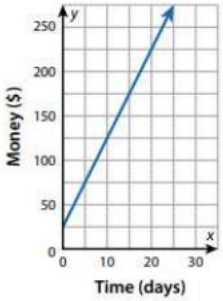


9) Write the linear function for the following. Use function notation

a)

Hours after Noon	Inches of Snow
0	6
1	8.5
2	11

b)



c) The temperature is 45 degrees F and expected to fall 2 degrees each hour during the night. Use function notation, define variable.

d) A computer technician charges $75 for a consultation plus $35 per hour. Use function notation, define variable.

10) The population of Jose's town in 2015 was 2400 and the population in 2020 was 4000. Let x represent the number of years since the first time given, 2015.
    a) Write a linear equation, that represents this data.
    b) Use the equation to find when the population would reach 4500 if the linear trend continued. Show work.

Topic 3: Solving equations/formulas of all types:

- To solve linear equations, clear fractions if needed by multiplying through by LCD first. Clear parentheses.
- To solve quadratic equations, set =0, clear fractions if needed, factor or if not able to factor or not easily factored, use the quadratic formula.
- To solve radical equations, isolate the radical, and for $\sqrt[n]{x}$, raise both sides to the n power (opposite operation)
- To solve equations with fractional exponents, change to radical form and then use steps to solve radical equation above. $x^{m/n} = \sqrt[n]{x^m}$
- To solve equations with negative exponents, rewrite with positive exponents, multiply both sides by the LCD to clear denominators, then solve.
- To solve power equations, isolate the variable term and for x^n, take the $\sqrt[n]{\ }$ of both sides. Remember if n is even, you must include +/-. Use the $\sqrt[x]{\ }$ button as needed.
- To solve exponential equations, isolate the x term and change to logarithm form (formula you need to know)
- To solve logarithmic equations, isolate the x term and change to exponential form (formula you need to know)
- To solve formulas, clear out fraction, parentheses and isolate the variable, each step doing the opposite operation to both sides. **Remember if two terms have the variable, get them on one side and factor the variable out.

1. Solve algebraically (show all work). Give answers as reduced fractions or integers if possible. If not, round to 2 decimal places. NO GUESS AND CHECK!

a) $16 = 8 - 2x$ b) $-3(x+8) = 2(x+3) + 10$ c) $\frac{2}{3}x - \frac{1}{2} = \frac{7}{6} + \frac{1}{2}x$

d) $\frac{5}{4}x + 3 = x - \frac{1}{4}$ e) $5t - 2r = 25 \; for \; t$ f) $S = R - rR \;\; for \; R$

g) $I = Prt \; for \; r$ h) $R = \frac{l+3w}{2} \; for \; w$ i) $4x^4 = 324$

j) $\sqrt[3]{x} + 1 = 7$ k) $x^2 + 5 = 1$ l) $5 - \sqrt{x} = 4$

m) $14x^{0.34} = 7$ n) $2x^{1/3} = -4$ o) $x^{2/3} = 3$

p) $x^{-3} = 125$ q) $\frac{1}{2}x^{-2} = 5$ r) $x^2 = 9x - 20$

s) $d^2 - 2d = 0$ t) $3x^2 - 12 = 0$ u) $x^2 - x = 3$

v) $x^2 + 4 = 0$ w) $1.2 \cdot 5^x = 12$ x) $2 + 0.5e^{0.2x} = 7$

y) $2 - 4\ln(x) = 10$ z) $\log(2x) + 4 = 6$

2. Suppose that x is the year from the year 2000 and y is the percent. Show all work algebraically to find the year when the percent is 50. You must show all your steps to solve (no guess and check)

a) If $f(x) = 8.77 + 14.9\ln(x)$ b) $f(x) = 2.1x^2 - 4x + 10$ c) $f(x) = 30.2x^{1.4}$

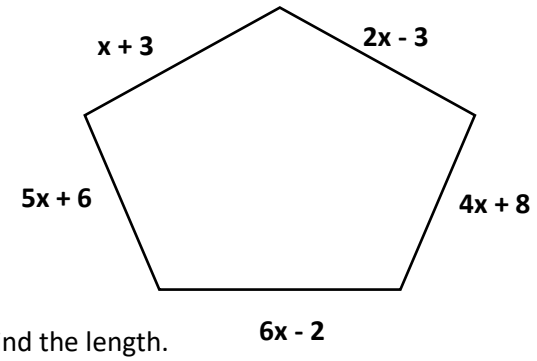
d) $f(x) = 10(1.8)^x$ e) $f(x) = 3.2x + 10$

Topic 4 – Geometry:

1) Know perimeter is the distance around the outer edges of a figure and area is the amount of space taken up. You don't know need to memorize perimeter formulas. But, you do need to know the two area formulas listed at the top of the document (area of a triangle and rectangle)

Practice for Topic 4:

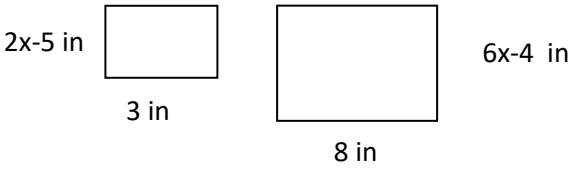
1) Find the perimeter of the following polygon



2) If the width of a rectangle is $2x + 3$ and the perimeter is 10x - 2, find the length.

3) Find the area of a triangle if the base is 2x-7 cm and the height is 10 cm. Include units on answer.

4) Find the total area of both rectangles.



5) The perimeter of a rectangular garden is 32 m. Its length is 1 more than 2 times the width. Set up an equation to solve for the width. Solve the equation and then use it to find the area of the garden. Include units on your answers.

Topic 5: Vocabulary

For polynomials: degree = highest power, leading coefficient = number in front of x term of highest power, constant = term with no variable.

Key words:

Of	Multiplication
Is/was	equals
Product, factor, times, double, triple	multiplication
Difference	Subtraction
Quotient	Division
Sum	addition

Topic 5 practice:

1) Use the polynomial to answer the question: $-2x^2 + 8x - 7x^5 - 4$

a) How many terms are in the polynomial above?
b) Write the polynomial in Standard Form (descending order).
c) What is the leading coefficient?
d) What is the constant of the polynomial?
e) What is the degree of the polynomial?

2) Translate into an expression:
   a) The difference of 17 and 5 times a number
   b) 5 more than twice x
   c) 3 decreased by the product of 5 and x
   d) The sum of x and twice y
   e) The difference of 3 times x squared and y

Topic 6 conversions:

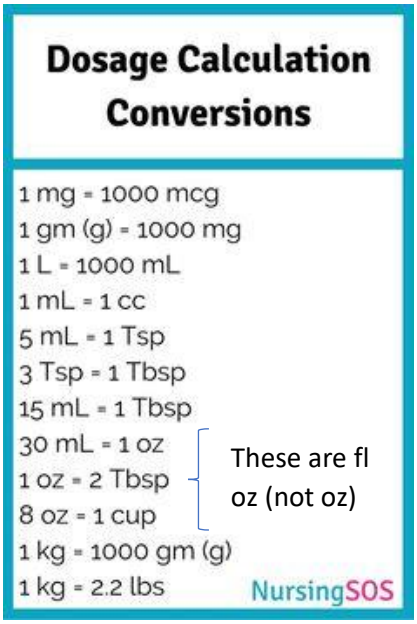
- Know the conversions listed at the top of this document (under formulas to know)

Topic 6 practice:

1) State whether the following are volume (V), area (A), length (L), or weight (w).

a) Ounces (oz) b) fluid ounces (fl oz) c) cubic yards d) km e) square inches f) tsp

2) Convert. Round to the nearest hundredth if needed. Use the chart as needed.
   a) 100 square inches to square yard
   b) 2.4 m to mm
   c) 2 mi to inch (note: mi is miles, m is meters)
   d) 2.5 dg to cg
   e) 150 pounds to kg
   f) 50 mL to Tbsp
   g) 12 cubic feet to cubic inches
   h) 5 cc to mL
   i) 1200 cc to L
   j) 1 cup to Tbsp
   k) 40 ft/min to in/sec
   l) 12 kg/sec to lbs/min
   m) 9 pounds 12 oz to pounds.



3) Use $F = \frac{9}{5}C + 32$ to find:
   a) The measure in degree F or 40 degrees C
   b) The measure in degree C for 40 degrees F

Topic 7 – inequalities

- If you are struggling with which symbol to use, rewrite with the variable on the left side. For example, 3>x rewrite as x<3 so then you can read it as x is less than 3.
- Solving inequalities is just like solving equations, except if you multiple or divide by a negative, you must reverse the direction of the inequality.
- Graphically, if solving f(x) >0, give the x-intervals on which the graph is above the x-axis. f(x)<0, give the x-intervals where the graph is above the x-axis. If solving where f(x)>g(x) then find the x-intervals on which f is higher than g on the graph.

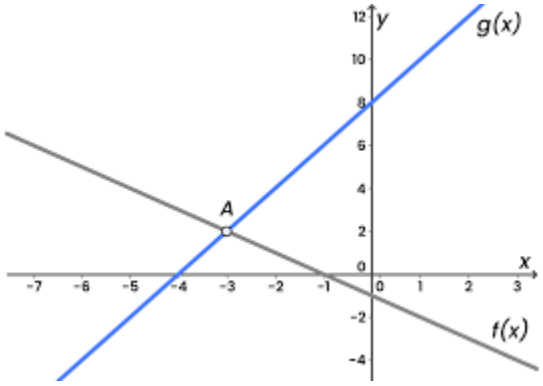
Topic 7 Practice:

1) Solve the inequalities algebraically. Write solution in interval notation.

a) $-2 \le \frac{3-5x}{8} \le 1$ b) $3x - 7 > 6x$

2) Set up an inequality and DEFINE the variable. **You do NOT need to solve:**
   a) Beth wanted to go to the school dance but only had $25 to spend. If the ticket cost $5 how many cookies could Beth buy at the dance if each cookie costs $1.25?
   b) George wanted to start his own painting business. He bought a ladder and some supplies for $180. He plans on charging $10 per hour painting. How many hours will George have to work if he is to make at least a profit of $750?
   c) Peter begins his kindergarten year able to spell 10 words. He is going to learn to spell 2 new words every day. Write an inequality to determine the minimum number of whole days it will take for him to be able to spell at least 75 words.
   d) Kamden's first 3 test scores are 70, 65, 82. What score would he need on the 4th exam to stay between 70-79.9 in the course? Again, set up, do not solve.

3) Solve the inequalities graphically.



   a) Find the interval(s) on which $f(x) > g(x)$
   b) Find the interval(s) on which $f(x) \leq g(x)$
   c) Find the interval(s) on which $g(x) > 0$
   d) Find the value of x where $f(x) = g(x)$
   e) Find the interval on which $g(x) > 8$

4) If f(x) = 5x + 2 gives the cost for x hours, write inequalities for the following (don't solve)

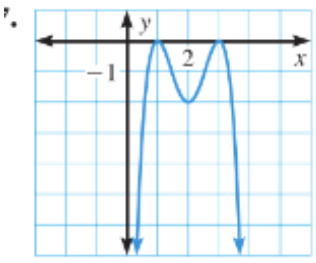
a) When will the cost exceed $18?
b) How long will the cost stay below $20?
b) How long will the cost be at least $30?
c) If Jim has $50, how many hours can he participate?

Topic 8: General Function items and reading graphs of functions

- Turning point(s) are where the graph goes from increasing to decreasing or decreasing to increasing
- When giving the intervals on which a function is increasing or decreasing, give X-intervals.
- When asked for the range of the function, use y-intervals
- On a graph, when asked to find f(#), that is f(x) so you want to find the y point on the graph when x=#.
- To be the graph of a function, it must pass vertical line test (no repeating x values)

Topic 8 practice:

1) Use the graph to a) find the turning points b) x and y- intercepts or write "none". c) find f(2) d) find f(3)
   e) How many places is f(x) = -1? You don't need to find them. f) explain why this this the graph of a function
   g) Give intervals on which f(x) is increasing. Use interval notation. h) give the range in interval notation.

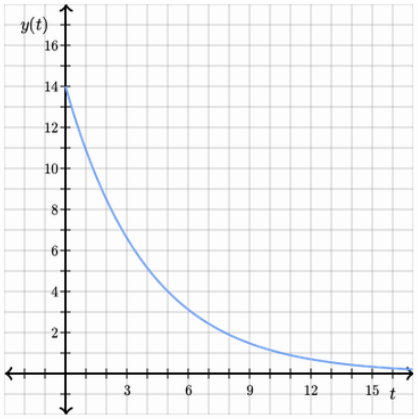


Topic 9: Percent

- To change from percent to decimal, divide by 100. To change from decimal to percent, multiply by 100%
- To find percent increase or decrease: |old – new|/old (find positive difference and divide by original amount)
- Percent increase: new amount = old + % OF old (of means times, so N=O+%*O)
- Percent decrease: new amount = old - % OF old (percent means times, so N=O -%*O)
- Of = multiplication and is becomes = when solving percent equations.

Topic 9 practice:

1) Solve:
   a) 12% of what is 15
   b) What percent of 12 is 15?
   c) 16% of 400 is what?
2) Solve the following.
   a) Last year the 6th grade had 350 students. This year the number decreased 36%. How many students are in this year's 6th grade class?
   b) Enrollment in the Ski/Snowboard Club increased by 30% this year. There are now 182 students in the club. How many students were there last year?
   a) The Game Stop is having a sale and all games are reduced by 55%. If a game is now $29.99, what was the original price? Round your answer to the nearest cent.
   b) If the percent of medication in the system dropped from 12 mg to 9 mg, what percent decrease was this?
   c) Forty percent of the people at the park brought a dog. If there were 120 people at the park, how many brought a dog?
   d) Forty percent of the people at the park brought a dog. If 20 people had dogs, how many people were at the park?
   e) If 12 of the 48 people at the park had dogs, what percent had dogs?
   3) Find the percent decrease from 0 to 6



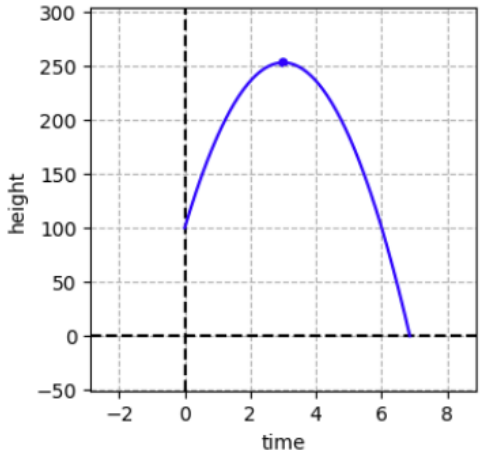
Topic 10: Quadratics

- You need to know the x-coordinate of the vertex x=-b/(2a). This is the max or min (depends on whether parabola opens up for down)
- You need to know how to factor quadratics:
  Step 1: Factor out the GCF if possible
  Step 2: Look at number of terms:
  a) If two terms, try difference of two squares $a^2-b^2 = (a+b)(a-b)$
  b) If 4 terms, try factor by grouping
  c) If 3 terms use trial and error or AC method.

  Step 3: Check your answer by multiplying the factored form out and see if you get original function.

Topic 10 Practice:

1) A ball is being thrown up into the air from the top of a building. The height in feet after t seconds is shown in the graph.

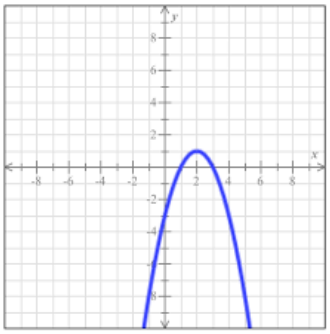


a) What is the initial height of the ball? Include units.
b) If the ball hits the ground at 6.4 secs, what is the domain? Use interval notation.
c) What is the range? Use interval notation.
d) Approximate the time(s) the ball is at 200 feet.
e) What is the maximum eight of the ball? Approximate the time it takes the ball to reach maximum height. Include units.

2) Fill in chart and graph

x	$y = x^2 - 2$
-3	
-2	
-1	
0	
1	
2	
3	

3)Use the graph to find the following:



a) Vertex: b) Axis of Symmetry:

c)State if max or min: Max/Min is _____ when x = _____

d)Concave up or down? e) Increasing on: f) Decreasing on:

g)Domain: h) Range: i) x-intercept(s): j) y-intercept:

4Use the function to find the following: $f(x) = x^2 - 4x - 5$

a) Vertex: b) Axis of Symmetry:

c)State if max or min: Max/Min is _____ when x = _____

d)Concave up or down? e) Increasing on: f) Decreasing on:

g) Domain: h) Range: i) x-intercept(s): j) y-intercept:

5) If a toy rocket is launched vertically upward from ground level with an initial velocity of 128 feet per second, then its height h, after t seconds is given by the equation $h(t) = -16t^2 + 128t$ (air resistance is neglected). Use algebra to find the following (no guess and check) and put units on answers.
   a. Find the height of the rocket after 1 second.
   b. How long will it take the rocket to hit its maximum height?
   c. What is the maximum height?
   d. How long did it take for the rocket to reach the ground?

6) The total revenue function for the home theater system is given by R=266x and the total cost for the system is $C=2000+46x+2x^2$, where R and C are measure in dollars and x is the number of units produced and sold.

a) From the profit function for this product

b) What is the maximum profit (find algebraically) and how many units must be produced to reach maximum profit?

7) Factor Completely or state prime:

a) $36x^2 - 9$ b) $21x^2 + 11x - 2$ c) $10s^2 - 5s + 2st - t$ d) $10x^6 + 14x^2$

e) $m^2 - 9m - 22$ f) $-4x^2 - 16x - 15$ g) $x^3 + 3x^2 - 4x - 12$ h) $2x^2 + 8x + 6$

i) $x^2 + 4$ j) $12 - 3y^2$ k) $x^2 - x - 5$ l) $-x^2 - x + 6$

Topic 11: Solving Systems

- The solution of a 2 by 2 system is an ordered pair (x,y). Check it in both equations to see if it makes it true.
- 0=5 implies NO solution (nonsense) 0=0 implies infinitely many solutions (always true)
- Use substitution or elimination to solve systems. Clear out fractions first by multiplying through by LCD

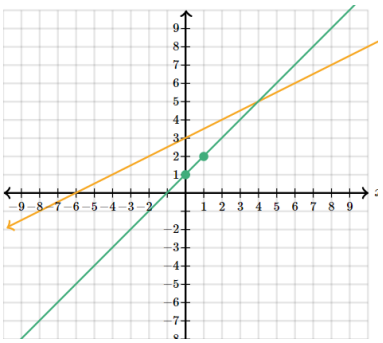
Topic 11 practice:

1) Solve algebraically

a) $\begin{cases} 2x - 4y = 12 \\ -\frac{1}{2}x + y = 4 \end{cases}$ b) $\begin{cases} 4x + 7y = 30 \\ 2x - 3y = 2 \end{cases}$ c) $\begin{cases} 4x - 6y = 4 \\ 2x - 3y = 2 \end{cases}$

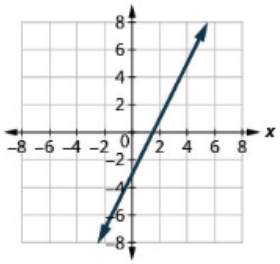
2) Solve the system:

a)

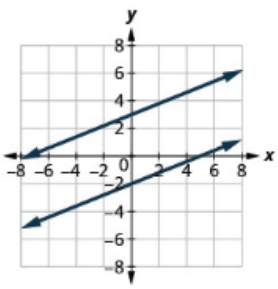


b)

Line 1 = line 2



c)



3) **Set up a system and solve**. You MUST define the variables used properly.

a) Tickets for the Valentine Dance cost $3 per person or $5 per couple. If $475 worth of tickets were sold and 180 people attended the dance, how many couples were there?

b) The difference of two numbers is 15. Five times the smaller number is the same as 9 less than twice the larger number. Find the numbers.

c) A farmer has two types of milk, one that is 24% butterfat and another which is 18% butterfat. How much of each should he use to end up with 42 gallons of 20% butterfat?

Topic 12: Exponential Functions

- An equation with the variable (letter) in the exponent is an exponential equation.
- To solve exponential equations, isolate the term on a side by itself, divide out coefficient (practice problems in topic #3)
- $y = a \cdot b^x$, the a is initial amount and the growth or decay factor is b, b=1+r or b=1-r where r is a growth or decay rate as a decimal.
- $y = a \cdot (1 + r)^x$ is growth and $y = a \cdot (1 - r)^x$ is decay.

1) If $y = 500 \cdot 2^x$ represents the number of bacteria after x minutes

A) How many bacteria were there initially? B) What do the following represent (the solution):

b1) $1000 = 500 \cdot 2^x$ b2) $y = 500 \cdot 2^4$ b3) $1200 > 500 \cdot 2^x$ c) Find the number of bacteria after 2.5 minutes d) After how many minutes is there 256,000 bacteria? Set up an equation. Then solve it.

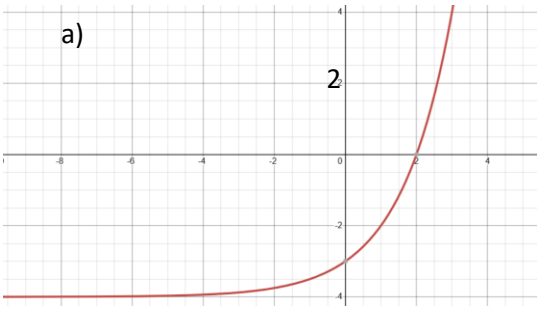
2) The number of a type of bird has been in decline. If originally there were 20,000 birds in 2010 and each year there is 80% of the previous year. Note: 80% means 20% decline each year!

A) How many birds would you expect there to be at end of the 2nd year? B) Write a function that gives the number of birds, N, after *x* years from 2010. C) Find the approximate number of birds in 2013.

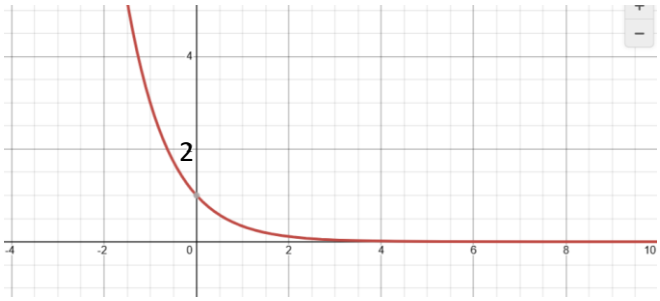
D) Set up the following, <u>do not solve:</u> D1) Find the year in which the number of birds would be half of what it originally was. D2) Find the year in which the number of birds will be less than 12,000.

3) Give the domain, range, y-intercept and horizontal asymptote for each exponential function. State whether it is exponential growth or decay.

a)



b)



4) Are the following growth or decay? State the rate of growth or decay (as a percent).

a) $y = 2(0.94)^t$ b) $y = 3(\frac{1}{3})^x$ c) $y = 0.5(4)^x$

5) Write the exponential function:

a) The initial amount is 50 g and decreases by 10% per year.

b) The initial amount is 20 L and increases by 0.02% per year.

Topic 13: Logarithmic Functions

- To graph a logarithmic function, switch the ordered pairs of the corresponding exponential function. (x,y) on $y=b^x$ becomes (y,x) on the graph of $y=\log_b x$
- Solve logarithmic equations by changing to exponential form (in topic #3 above)

Topic 13 practice:

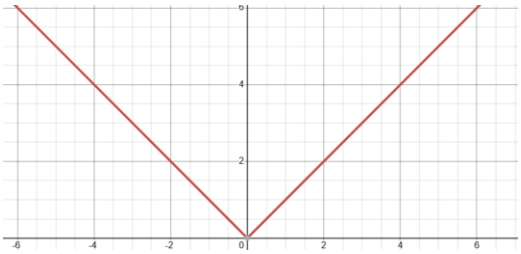
2) Graph $y= 3^x$ by plotting x=-2,-1,0,1,2. Use it to graph $y = log_3 x$. State the domain and range of $y = log_3 x$.

Topic 14: Transformations

- If c>0, f(x)+c shifts f(x) up c units; f(x) – c shifts f(x) down c units, f(x-c) shifts f(x) right c, f(x+c) shifts f(x) left c.

Topic 14 practice:

1) Given the following graph of y=|x|, graph the following (on same grid), state the domain and range and interval(s) on which f(x) is increasing.

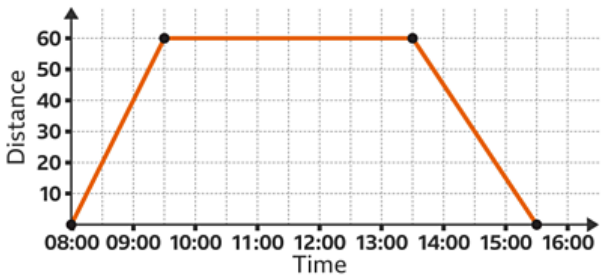


a) f(x) = |x + 2|
domain:
Range:
Increasing:

b) f(x) = |x| + 2
domain:
Range:
Increasing:

2) Write the equation for the graph of the function that is found by shifting $f(x) = \sqrt[3]{x}$ right 2 and down 1

3) Suppose Chuck heads to a job site at 8:00 am. After 4 hours, he heads back home. The graph gives the distance, in miles, from home.



a) Give the domain and range in interval notation.
b) Draw the graph if Chuck started this same journey at 8:30 a.m. instead (use same graph)
c) Draw this graph if Chuck started this same journey, but started 10 miles from home (use same graph)

4) Suppose that x is the year from the year 2000 and y is the percent. Write models for the following if instead x was the number of years since 2005
a) If $f(x) = 8.77 + 14.9\ln(x)$ b) $f(x) = 2.1x^2 - 4x + 10$ c) $f(x) = 30.2x^{1.4}$

5) Suppose that x is the year from the year 2000 and y is the percent. Write models for the following if instead x was the number of years since 1992
a) $f(x) = 10(1.8)^x$ b) $f(x) = 3.2x + 10$

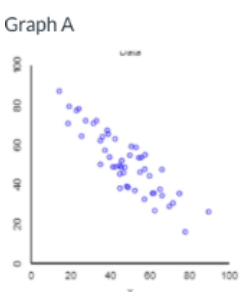
6) Describe the transformations from $y = x^3$ to the following.
a) $y = x^3 - 1$ b) $y = (x - 1)^3$ c) $y = (x + 2)^3 + 1$

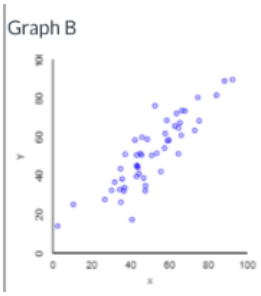
Topic 15: Regression

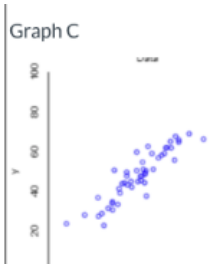
- Know the closer r^2 is to 1, the better the regression model fits the data set. Remember to find r from r^2, you must square root both sides. For lines, r is negative if the slope is negative, r is positive if the slope is positive.
- Know how to use regression models (solve for x or y)
- Know that interpolation is approximating for values inside the range of data values given; extrapolation is approximating for values outside the range of data values given.

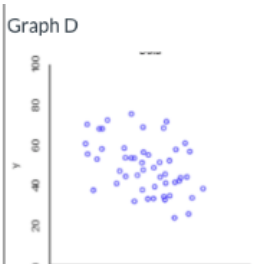
Topic 15 practice:

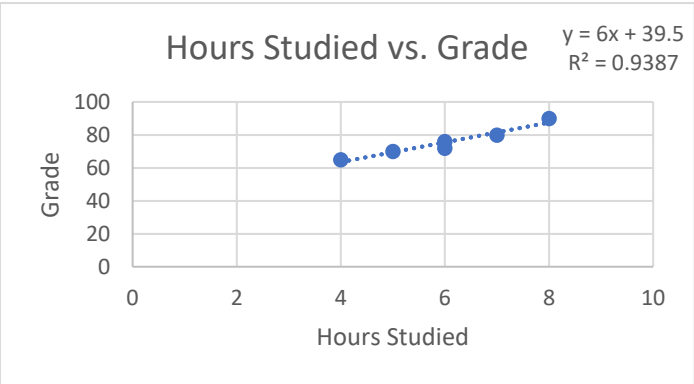
1) Choose the best value for the correlation from the list: r=0.907, r=-1, r=0, r= -0.876, r= -0.427, r=2, r=0.877





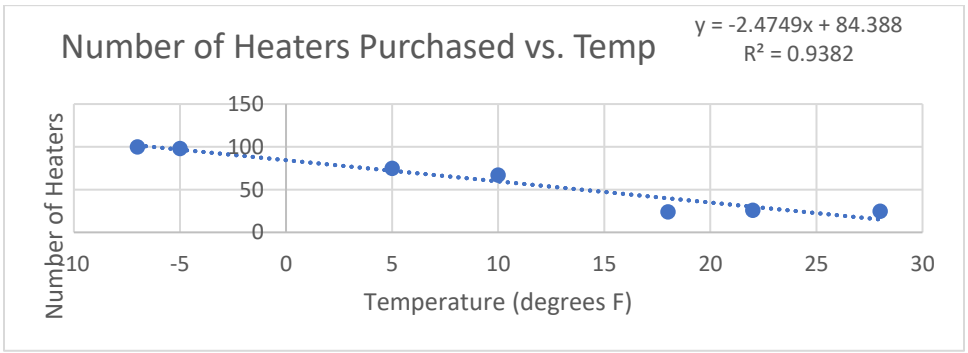






a) What is the value of r? Is there a strong correlation? Why or why not?
b) Use the equation to approximate the grade if a student has studied 7 hours.
c) Use the equation to approximate the number of hours studied if the grade is 95. Is this extrapolation or interpolation?
d) Use the equation to approximate the number of hours studied if the grade is 72. Is this extrapolation or interpolation?

3) Use the graph below to answer the questions:



a) What is the value of r? Is there a strong correlation? Why or why not?
b) Use the equation to approximate the temperature if 50 heaters are purchased.

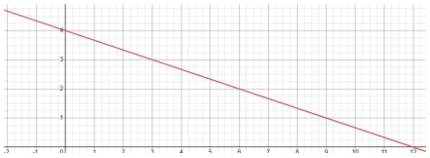
ANSWERS:

Topic 1 answers: (domain)

a) $[-\frac{5}{7}, \infty)$ b) $(-\infty, \infty)$ c) $(-\infty - 7), (-7, \infty)$ d) $(1, \infty)$ e) $(-\infty, \infty)$ f) [0,6] g) $(-\infty, \infty)$ h) $(0, \infty)$

Topic 2 answers: (linear)

1) A) C=44+45x b) C=3+2.50t, c) 4x+5 = 180 d) J+ 4/5*J = T
2) a) -5 acorns/day
   a) Initially there are 60 acorns b) 10 acorns c) 8 days d) [0,12] e) [0, 60] f) f(x) = -5x+60 g) 10 acorns, yes
   h) 8 days, yes.
3) Y values are 10, 14, 18, 22
4) a) (0,-9/7) and (3,0) b) m=3/7 y-int. = -9/7
5) a) Horizontal line through (0,-3). b) Vertical line through (4,0) c)



6) a) y=7x-2
   b) y-3= -4 (x+2) or y=-4x-5
   c) y-3 = -1/2(x-5) or y= -1/2x + 11/2
7) a) C(x)=1.35x+180

   b) R(x) = 3.13x

   c) (101.12, 316.52), must sell over 101 apples to break even (rev=cost = $316.52).

8) a) (50, 2450) must produce and sell 50 pair of jeans to break even (rev = cost = $2450)

b) x<50 pairs c) P(x) = 20x-1000 d) $600 profit from selling 80 pair of jeans e) $29/pair of jeans

f) $49/pair. Rev increases by $49/pair (selling one more pair, generates $49 in revenue).

9) a) f(x) = 5/2 x + 6 b) f(x) = 10x+25 c) f(x)=45-2x x= Number of hours d) C(x) = 75+35x x = number of hours
10) a) y=320x+2400 b) x=6.5625 years.

Topic 3 answers: (solving)

1)

a) -4 b) -2 c) 10 d) 13 e) t= (2s+2r)/5 f) R=S/(1-r) g) r=I/(Pt) h) w=(2R-l)/3 or w=2R/3 – l/3

i) 3, -3 j) 216 k) not real l) x=1 m) 0.130 n) -8 o) $\pm\sqrt{27}$ p) 1/5 q)$\pm\sqrt{\frac{1}{10}}$

r) x=5,4 s) d=0,2 t) x=2, -2 u) x=2.303, -1.303 v) no real solution w) $\log_5 10 = x$ (approx.. 1.43)

x) ln(10)/0.2 or approx.. 11.51 y) e^{-2} or approx. 0.14 z) x=50

2) a) x=15.91, 2016 b) 5.41944, 2006 c) 7.51367, 2008 d) 2.738, 2003 e) 12.5, 2013

Topic 4 answers: (geometry)

1) 18x+12 2) L=3x-4 c) 10x-35 square cm 8) 54x – 47 square inches 9) 55 square meters

Topic 5 answers (vocabulary)

1) A) 4 b) $-7x^5-2x^2+8x-4$ c) -7 d) -4 e) 5
2) A) 17-5x b) 5+2x c) 3-5x d) x+2y e) $3x^2 – y$

Topic 6 answers (conversions)

1) a) W b) V c) V d) L e) A f) V
2) a) 0.08 square yards b) 2400 mm c) 126,720 in d) 25 cg e) 68.18 kg f) 3.33 Tbsp
g) 20736 cubic inches h) 5 mL i) 1.2 L j) 16 Tbsp k) 8 in/sec l) 1584 lbs/min m) 9.75 lbs
3) a) 104 degrees F b) $4.\overline{4}$ degrees C

Topic 7 answers (inequalities)

1) [-1, 19/5] b) (-∞, -7/3)

2) 5+1.25x≤25 where x = # of cookies b) 10x-180≥750 where x=# of hours c) 10+2x≥75 x=# of days d) x= 4th exam grade: 70 ≤ (70+65+82+x)/4 ≤ 79.9

3) a) (-∞,-3) b) [-3,∞) c) (-4,∞) d) x= -3 e) (0,∞)

4) a) 5x+2>18 b) 5x+2<20 c) 5x+3≥ 30 d) 3x+3≤50

Topic 8 answers (function and graph reading)

a) TP: (1,0), (2,-2) (3,0) b) X-int: (1,0) and (3,0) y-int: None c) -2 d) 0 e) 4 f) passes vertical line test.

g) (-infinity, 1), (2,3) h) [0, infinity)

Topic 9 answers (percents)

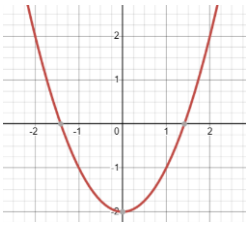
1) a) 125 b) 125% c) 64

2) a) 224 students b) 140 students c) $66.64 d) 25% e) 48 people f) 50 people g) 25%

3) 78.57%

Topic 10 answers (quadratics)

1) a) 100 ft b) [0,6.4] c) [0,250] d) approximately 1.2 sec and 4.8 sec (something close to this) e) 250 ft at approx.. 35 sec.
2)



3) a) (2,1) b) x=2 c) max is 1 when x=2 d) down e) (-∞,2) f) (2,∞) g) (-∞,∞) h) (-∞,1] i) (1,0), (3,0)
j) (0,-3)

4) a) (2,-9) b) x=2 c) min is -9 when x=2 d) up e) (2,∞) f) (-∞,2) g) (-∞, ∞) h) [-9,∞) i) (5,0) and (-1,0) j) (0,-5)

5) a) 112 ft b) 4 sec c) 256 feet d) 8 sec

6) a) $P(x) = -2x^2+220x-2000$ b) 55 units , $4050

7) a) (6x+3)(6x-3) b) (3x+2)(7x-1) c) (2s-1)(5s+t) d) $2x^2(5x^4+7)$ e) (m-11)(m+2) f) –(2x+5)(2x+3)
g)(x+3)(x+2)(x-2) h) 2(x+3)(x+1) i) prime j) 3(2-y)(2+y) k) prime l) –(x+3)(x-2)

Topic 11 answers: (Systems)

1) a) no solution b) (4,2) c) infinity many solutions

2) a) (4,5) b) infinity many solutions c) no solution

3) a) 65 couples (50 singles) b) x=22, y=7 c) 28 gal of 18% butterfat, 14 gal of 24% butterfat

Topic 12 answers (exponential)

1) a) 500 b1) After how many minutes will the number of bacteria be 1000? B2) How many bacteria will there be after 4 minute? B3) How long will the number of bacteria stay less than 1200? C) 2828 bacteria d) 9 minutes.

2) a) 12800 birds b) $N(x) = 20000(0.80)^x$ c) 10240 birds d1) $10000 = 20000(0.80)^x$ d2) $12000 > 20000(0.80)^x$ or $20000(0.80)^x < 12000$

3) a) growth, y-intercept (0,-3), horizontal asymptotes y=-4, range (-4, infinity)

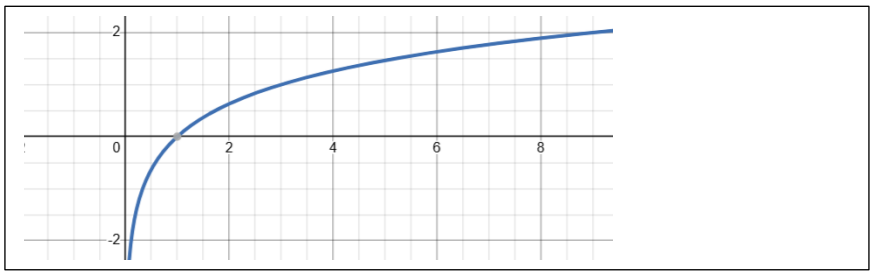
b) decay, y-intercept (0,1), horizontal asymptote y=0, range (0,infinity)

4) a) Decay 6% b) decay 66.67% c) growth 300%

5) $F(x)=50(0.90)^x$ b) $f(x) = 20(1.0002)^x$

Topic 13 answers: (logarithms)

1) Domain: (0,infinity); range (-infinity, infinity).

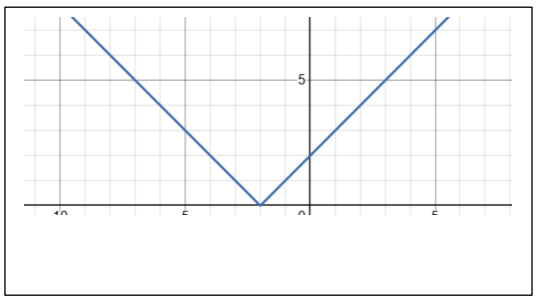


Topic 14 answers (transformations)

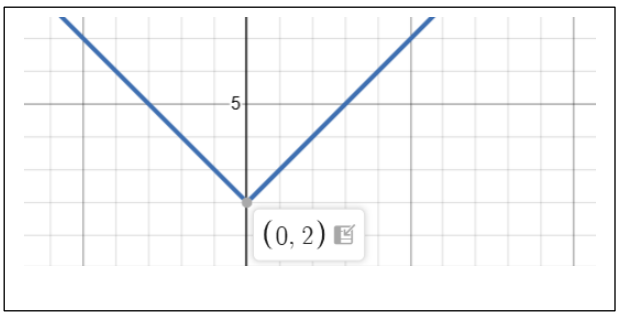
1) a) D: (-infinity, infinity), R: [0, infinity), increasing (-2, infinity). Graph below.

b) D: (-infinity, infinity), R: [2, infinity) Increasing (0, infinity). Graph below.

a)



b)



2) $g(x) = \sqrt[3]{x-2} - 1$

3) a) D: [8,15.5] or [8:00 am, 3:30 pm] Range: [0,60] b) Shift graph right half hour c) shift graph up 10

4) a) $f(x) = 8.77 + 14.9\ln(x+5)$ b) $f(x) = 2.1(x+5)^2 - 4(x+5) + 10$ c) $f(x) = 30.2(x+5)^{1.4}$

5) A)) $f(x) = 10(1.8)^{x-8}$ b) $f(x) = 3.2(x-8) + 10$

6) a) down 1 b) right 1 c) left 2 and up 1

Topic 15 practice answers (regression):

1) a) -0.876 b) 0.877 c) 0.907 d) -0.427

2) a) 0.9689, yes r is close to 1 b) 81.5 c) 9.25 hours, extrapolation c) 5.417 hours, interpolation

3) a) -0.9686, yes r is close to -1 b) 13.89 degrees F