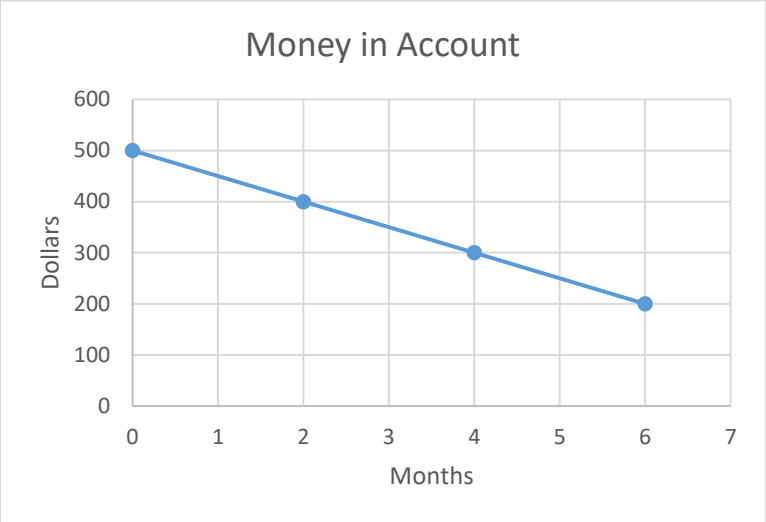
Spring 2025

- **You must show ALL work on this paper to receive credit.**
- **All electronics must be stored in a bag. No cellphone, headphones, smart watch, or sunglasses.**

If you are caught with a cell phone or unapproved electronic device, you will earn a 0.

1) Use the graph to answer the questions: <13 pts>



a) What Is the y-intercept and what does it represent?

b) What is the slope? Include units.

c) Use the graph to find f(4). Include units and interpret the result (what does it represent).

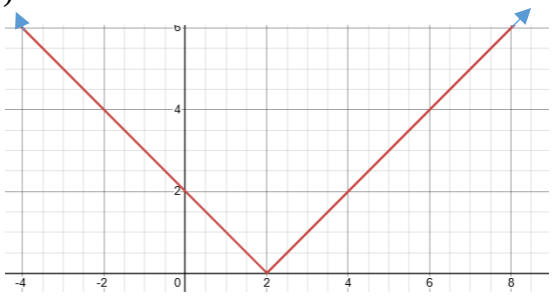
d) In what month would there be no money left in the account?

e) For what value of x is f(x)=400?

f) Write the equation that gives the amount in the account, A, after x months.

2) Write the domain, range, and interval on which the function is increasing in interval notation: <12>

a)

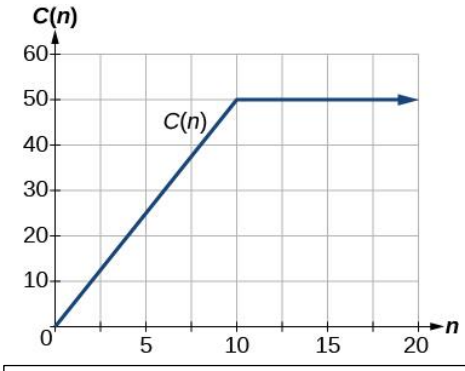


Domain:

Range:

Increasing:

b)



Domain:

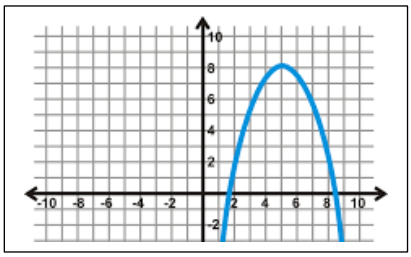
Range:

Increasing:

3) In the blank under each, write the LETTER that fits each:

<9 pts>

A= exponential growth function
B = exponential decay function
C= quadratic function
D= linear Function
E = logarithmic Function
F = power function (other than quadratic or linear)



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$y = 2.2x^{4.1}$

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x	Y
5	7
6	14
7	28
8	56
9	112

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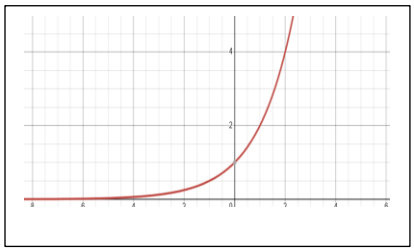

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$y = 2.3 - 5\ln(x)$

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$y = 5(0.4)^x$

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$y = -7.2x + 8$

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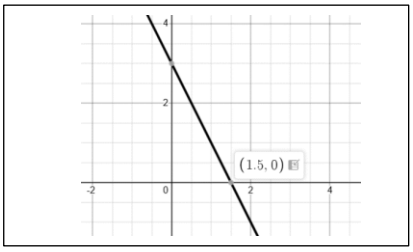

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$y = -2x^2 + 5x - 7$

_____

4) Find the equation of the line through (-3, 4) and (-5, 6). Don't use decimals. <6 pts>

5) Find the area and perimeter, include units: <6 pts>

4 in

7x – 5 in

Perimeter:

Area:

6) Write a function for the amount, A. Define the variable in your function (for example x = # of cats) <9 pts>

a) There are initial 50 g of a toxic substance and each year the amount is 80% of what it previously was the previous year.

b) There are 40 trees in park and a group of people plan to plant 2 more trees per month.

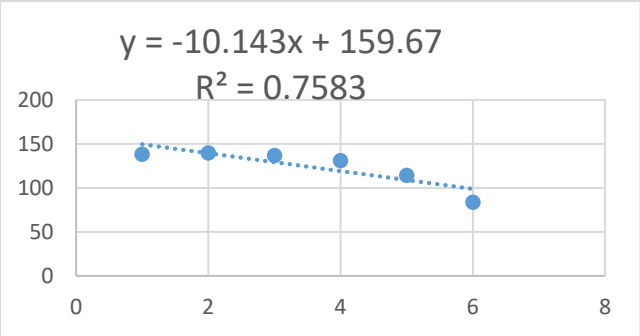
c) The amount is 5 more than twice x. (don't need to define x here)

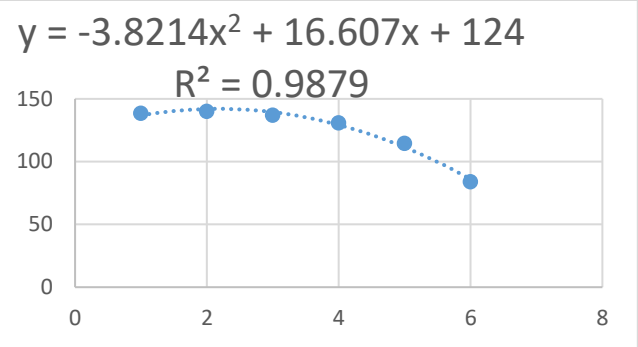
7) Solve. Write answer in interval notation: $-2 < \frac{-4x+1}{3} \leq 6$ <6 pts>

8) Factor Completely: <15 pts>

a) $5x^2 - 20$ b) $x^2 - 8x - 20$ c) $2x^2 + 7x - 15$

9) A data set that gives the height, y, of an object in meters after x seconds was used to find the two regression models below. <10 pts>





a) Which model is the better fit? Why?

b) Use the better fit equation to find the number of seconds it would take the object to reach 50 meters? Set up and solve. Show all your work. Include units on answer.

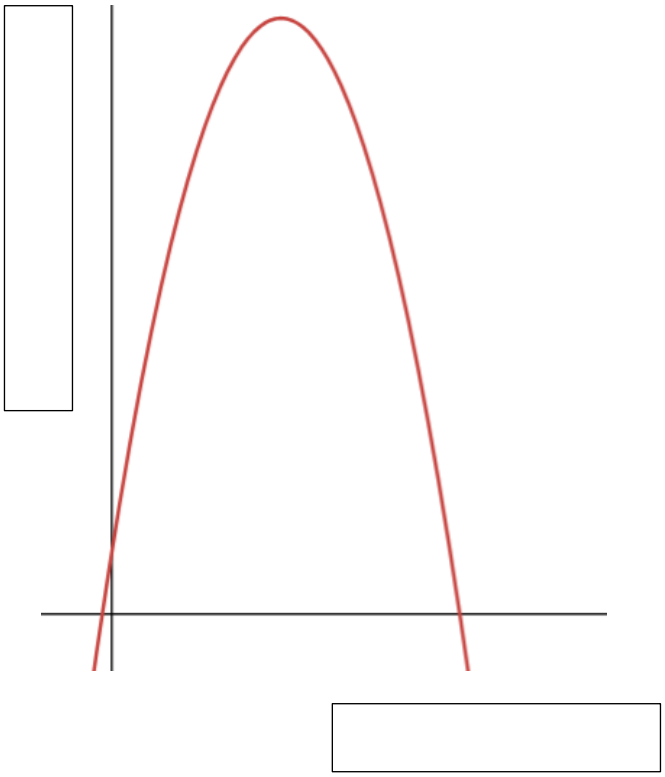
c) Did you use interpolation or extrapolation for part b)? Explain.

10) Solve the following for h: <10 pts>

a) $A = \frac{1}{2}bh$

b) $2h + 5y = 6hy + 7$

11) A ball is thrown up in the air and its height at time t is given by $h(t) = -16t^2 + 48t + 3$ where h is in feet and time t is in seconds. <10 pts>



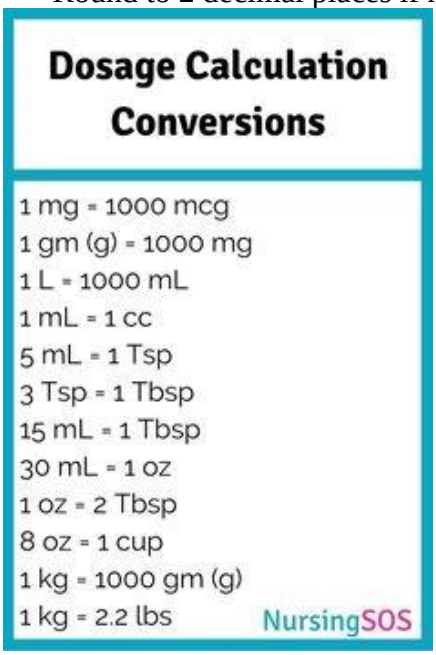
a) Label the axes on the graph to the left with appropriate units. Place units in given boxes.

b) Find the initial height of the ball and label it on the graph. Include units.

c) At what time does the ball reach maximum height? Include units. Find the answer algebraically. Label on graph.

d) What is the maximum height the ball reaches? Include units. Label on graph.

12) Use the chart to convert the following. Put units on answers. Note: oz = fluid ounces (fl oz) <9 pts>
Round to 2 decimal places if needed.



a) 150 lbs to kg

b) 0.0021 g to mcg

c) 200 mL to cups

13) Write an equation of a function that has the shape of $y = x^2$ but shifted right 5 and down 2. <5 pts>

14) Solve for x. Leave answers in exact form (no rounded decimals) <24 pts>

a) $2(x-4)+8x = 7+x$

b) $2x^2 - 10 = 0$

c) $5x^{1/3} = 20$

d) $x^{-2} = 9$

15) Solve the system algebraically. Write answer as an ordered pair or state no solution or infinity many solutions. You must show all appropriate algebraic steps (no guess and check) < 6 pts>

$$\begin{cases} 3x + y = 10 \\ -4x - 2y = 2 \end{cases}$$

16) A chemist has two solutions, one 14% acid and the other 30% acid. How much of each solution should he mix together to produce 100 mL of a solution that is 20% acid. Define variables, set up system, **do not solve.** <5 pts>

17) The population in a certain city can be modeled by $P = 26000e^{0.025t}$ people where t is the number of years after 2020. < 8 pts>

a) Determine algebraically the approximate population in the year 2025. Round to nearest whole number.

b) Determine algebraically (set up and solve) in which year the population will reach 30,000. Show all steps.

18) A plant grew from 6 inches to 10 inches in two years. What percent increase is this? Round to the nearest hundredth of a percent. <5 pts>

19) If 328 are infected with a fungus and this represents 32% of the pinecones at the park, how many pinecones are at the park? <5 pts>

20) If the sales tax is 9%, what is the sales tax on an item that cost $40? <5 pts>

21) Solve for y then state the slope and y-intercept: $5x - 7y = 14$ <6 pts>

Solve for y:

Slope:

y-intercept: (,)

22) The life expectancy in a certain country can be modeled by $y = 42.5 + 13.9\ln(x)$ where x is the number of years after 2030. How many years after 2030 would the life expectancy reach 80 years old? Find your solution algebraically. Round to 2 decimal places. Show your steps!

<6 pts>

23) The fixed costs per month to produce Madelyn's Taffy is $400.50 plus a cost of $1.50 per pack. Each pack sells for $6. <10 pts>

a) Write the cost function to produce x packs

b) Write the revenue function for sale of x packs.

c) Find the break-even point (algebraically) and state what it represents. Find both x and y, where y is the revenue and cost. Include units.