

1. For each of the following, write the first 5 terms of the sequence.

a. $a_n = 31 - 7n$

b. $a_1 = 12, a_n = 2a_{n-1} - 10$

c. $a_n = \frac{n(3^{n-1})}{n+1}$

2. For each problem, determine the sum of generating each term and calculate using the calculator:

a. $\sum_{i=1}^7 (6i - 5)$

b. $\sum_{j=1}^6 \frac{j^2 - 1}{j^2 + 1}$

c. $\sum_{k=1}^8 (-2)^{k-1}$

3. Find the missing variable of (a_1, d, n, a_n) in the sequence and write the sequence's first 4 terms.

a. $a_1 = 8, d = 2.5, n = 80$

b. $a_1 = -108, a_{24} = 156$

c. $a_1 = 135, d = -4.25, a_n = -35$

4. Find the sums in the arithmetic sequences:

a. $a_1 = -61, a_{36} = 44$

b. $\sum_{n=1}^{21} 25n - 124$

c. $250 - 234 - 218 - \dots - 438$

d. $\sum_{n=50}^{100} 50 - 8n$

e.

Bees for a honeycomb starting with one central cell. They then add on rings of cells as shown in the figure. How many total cells are there after 20 rings are added?



5. I start a monthly bicycle training program, doing 2.5 miles the first day and upping my distance by 0.25 mile each day thereafter. How many days until I reach a total of 70 miles?

1. Write the first 5 terms of the geometric sequence and a rule for the n th term.

a. $a_1 = 1.5, r = 6$

b. $a_1 = \frac{\sqrt{2}}{2}, r = \sqrt{2}$

c. $a_1 = -4, r = -\frac{1}{\pi}$

2. Find the missing variable (a_1, r, n, a_n) in the geometric sequence and write the first 3 terms of the sequence.

a. $a_1 = 3, r = 4, n = 5$

b. the 13th term of $40, 20\sqrt{2}, 20, 10\sqrt{2}, \dots$

c. $a_1 = -\frac{8}{3}, a_6 = \frac{81}{4}$

3. Find the first term and sixth of the geometric sequence $a_3 = \frac{-3}{4}, a_5 = \frac{-75}{16}$. Answers in fraction form.

4. Find the indicated sum. Use a calculator to crunch the numbers.

a. The first 15 terms of
 $270, 90, 30, \dots$

b. $\sum_{n=1}^{12} 80(0.8)^{n-1}$

c. $\sum_{n=0}^{20} 1000(1.06)^n$

5. An investor purchases a certificate of Deposit (CD) for \$100,000 which is guaranteed to earn 5% interest a year for 10 years. What is average rate of change in the value of the CD over its duration?

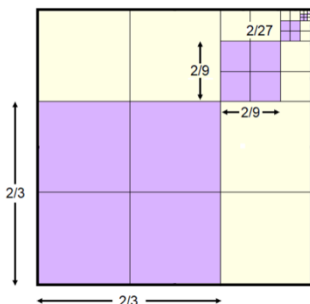
6. Ted's wife has racked up huge credit card bills and Ted puts her on a rigid payback system. In January, she pays back \$2,700. Each subsequent month, she pays back $\frac{2}{3}$ of the previous month's payment.

- a. How much will she pay in December of the 1st year? b. How much less will she have paid from July to Dec than from Jan to June? c. If she keeps paying forever how much will she pay?

7. A typical new car depreciates 20% of its value in its first year. After that, it depreciates 14% of its value every year. Suppose a new car costs \$55,000.

- a. What is it worth after 5 years? b. If the owner decides to keep it for another 3 years, how much more value will it lose in that time?

8. Show that the area of the shaded region is $\frac{1}{2}$ the area of the square.



1. If $f(x) = 3^x$, describe the transformation on $f(x)$ for each of the following and find the y -intercept of the explaining your answers.

a. $f(x) + 3$

b. $f(x) - 3$

c. $f(x - 3)$

d. $f(x + 3)$

d. $f(3x)$

b. $f(-3x)$

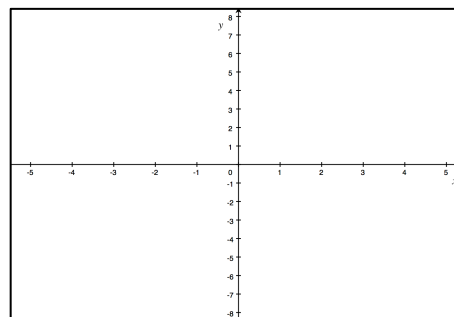
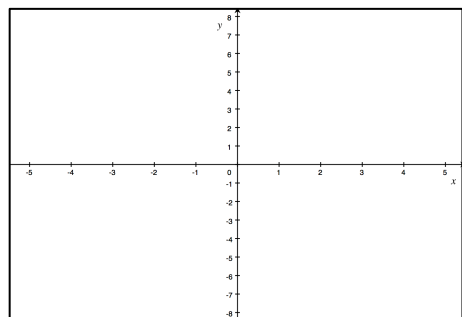
c. $-3f(x)$

d. $-3f(-x)$

2. Given the following functions, simplify algebraically and graph the transformation.

a. $f(x) = 25^x, f\left(\frac{x-1}{2}\right)$

b. $f(x) = 64^x, f\left(\frac{1-x}{3}\right)$



3. Solve the following exponential equations.

a. $2^{2x-3} = 8$

b. $5^{\frac{1}{2}x+4} = \frac{1}{5}$

c. $9^{4x-1} = 27$

d. $8^{3x-2} = \left(\frac{1}{64}\right)^{1-x}$

e. $4^{1-3x} = \sqrt[3]{2}$

f. $9^{5-2x} = 1$

4. Create an exponential function from the given two points and use it to predict the value of y at the given x .

a. $(0, 3)$ and $(1, 2)$, $x = 3$

b. $(2, 14)$ and $(4, 49)$, $x = 6$

5. Bond-All, an item that will glue anything together, is advertised on TV. For a period of 4 weeks, Bond-All is relentlessly shown in commercials and after that, is not advertised for quite a while because of the cost of doing so. After 2 weeks of advertising, Bond-All has sold 65,000 units and after 4 weeks, Bond-All has sold 90,000 units.
- Create a linear and exponential model from the data.
 - Based on this data, predict the difference of sales between the two models if the commercials were stopped after 1.5 weeks.
 - Predict the difference in sales between the two models 1 week after advertising stopped.
 - Would you feel comfortable using these models to predict sales 1 month after advertising stopped? Explain.

1. For each of the functions $f(x) = 1 - x^2$ and $g(x) = 4x - 3$, find the following.

a. $(g \circ f)(3)$

b. $(f \circ g)(3)$

c. $(f \circ g)(x)$

2. For each of the functions $f(x) = \frac{x}{x-1}$ and $g(x) = 3x^2$, find the following.

a. $(g \circ f)(-1)$

b. $(f \circ g)(-1)$

c. $(g \circ f)(x)$

3. Find a composite function for $f(x) = \frac{2x-3}{3x-2}$ and $g(x) = \frac{3}{2x+6}$ and its domain.

a. $(f \circ g)(x)$

b. the domain of $(f \circ g)(x)$

4. Decompose the following functions so that $h(x) = f(g(x))$.

a. $h(x) = \frac{2x+5}{4x^2}$

b. $h(x) = \sqrt[3]{7x-8}$

5. There are 200 people waiting in line to get free bottles of water after an earthquake. That number increases by 5 people per minute. There are 50,000 bottles available when the distribution starts.

- Write a function N for the number of people in line at any time t , measured in minutes.
- Write a function F for the number of bottles each person gets, if x is the number of people in line.
- Write a composite function R for the number of bottles each person gets as a function of time.

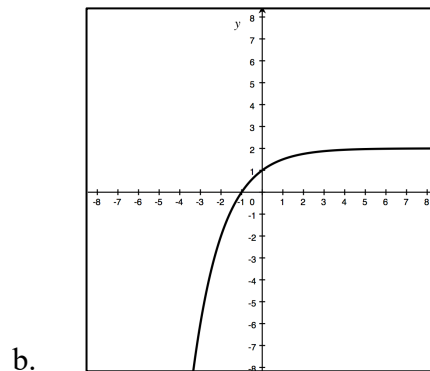
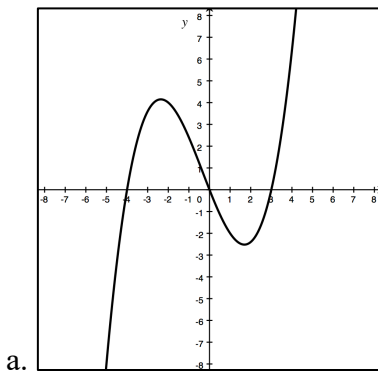
6. Show work using $f \circ g$ to illustrate that f and g are inverses.

a. $f(x) = 5x - 2, g(x) = \frac{x+2}{5}$

b. $f(x) = \frac{x}{6x+5}, g(x) = \frac{5x}{1-6x}$

7. Which, if any of the functions are one-to-one? Explain.

8. Sketch the inverse of each.



9. For the following functions $f(x)$, find the inverse $f^{-1}(x)$. Determine if $f^{-1}(x)$ is a function.

a. $y = 6x - 8$

b. $y = x^2 - 6x + 9$

c. $y = x^3 - 5$

d. $y = \sqrt[4]{2x+16}, x \geq -8$

e. $y = \frac{3x+1}{x-3}$

f. $y = \frac{x^2}{x^2-9}$

10. If $f(x) = 3x - 5$ and $g(x) = x + 4$, evaluate the following at $x = 4$.

a. $(f^{-1} \circ g^{-1})$

b. $(f \circ g)^{-1}$

11. The Middleburg's take their son Geoff to a county fair. The cost to park their car is \$10. Rides are classified as major or minor with major rides costing \$1.50 while minor rides cost \$1.00. Geoff's parents have limited the number of rides for Geoff to 15.

- If x is the number of major rides Geoff rides, write the total cost to the parents as a function of x .
- Write the inverse to the cost function and describe what it means.
- Use the inverse when $x = 30$ and describe what it means.

1. Find the values of the following. Show how you get your answer.

a. $\log_2 16$

b. $\log_9 27$

c. $\log_{32} \sqrt{2}$

d. $6\log_{20} 1$

e. $\left(\log_{16} \frac{1}{4}\right)^3$

f. $-8\log \sqrt[4]{10}$

g. $\ln\left(\frac{1}{e^2}\right)$

h. $10^{\log 4}$

i. $\frac{\log 10}{\ln e}$

j. $\log_2 4^x$

k. $\frac{10}{\log 0.01}$

l. $\ln \frac{\sqrt{e}}{e}$

m. $-3\log_{64} 16$

n. $2 - 4\log_{36} \frac{1}{216}$

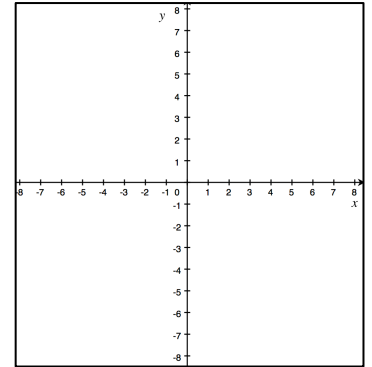
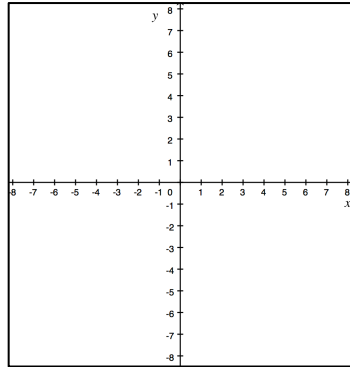
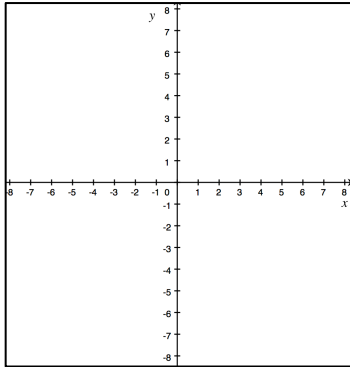
o. $9\log_{1/8} 128$

2. Sketch the transformation of the given log curve, plotting 3 “nice” points.

a. $y = \log_2 x + 1$

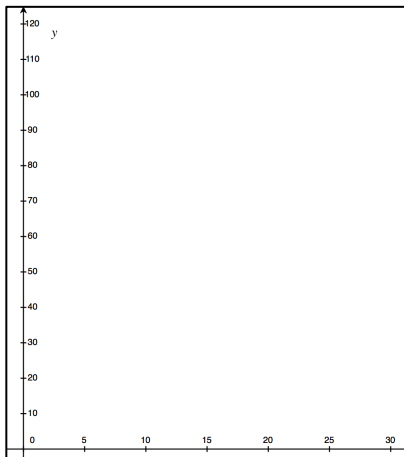
b. $y = 3\log_{1/2}(x-1)$

c. $y = 4 - 2\ln x$



3. Two popular restaurants with the same seating capacity open at 5:00 PM for dinner and they fill rather quickly. The number of tables available at Frank’s is given by the function $f(t) = 125 - 80\log(t+1)$ while the number of tables available at Gabe’s is given by the function $g(t) = 125 - 32\ln(t+1)$. Both are functions of t where t is measured in minutes after 5:00 PM.

a. Graph the functions over the first half hour.



b. What is the difference in percentage of the restaurant’s tables that are available after 5:15 PM?

c. At what time will both restaurants be filled to capacity?

1. Use the operation rules to find the values of the following expressions:

a. $\log_6 4 + \log_6 9$

b. $\log_3 2 - \log_3 54$

c. $\log 25 + \log 2 + \log 20$

d. $\ln ae - \ln a, a > 0$

2. Given that $\log 3 = x$, $\log 4 = y$ and $\log 11 = z$, find the following in terms of x, y and z .

a. $\log 48$

b. $\log 33000$

c. $\log 1.32$

d. $\log \sqrt{\frac{11}{108}}$

3. Write the following in terms of a single log or natural log (ln) involving expressions of x, y and z .

a. $3\log x + 4\log y$

b. $2\log x - 2\log y - 2\log z$

c. $\ln x - 3$

d. $2\ln x + \frac{1}{2}\ln y - \frac{3}{4}\ln z$

4. Solve each equation in terms of x .

a. $\log_4(3x - 2) = 2$

b. $\log_x(5x + 14) = 2$

c. $\log(2x - 1) - \log 5 = 0$

d. $\ln 4x + \ln 8 = 4$

e. $\log(6x + 34) - \log(1 - 3x) = 1$

f. $\ln(x + 4) - \ln(x - 2) = 2$

1. Use the change of base formula using base 10 to calculate the following to 3 decimal places.

a. $\log_5 12$

b. $\log_2 100$

c. $\log_8 6$

2. Solve for x algebraically and then 3 decimal places.

a. $4^x = 20$

b. $3e^{2x-3} = 15$

c. $6^x = 3^{x+1}$

d. $2^{3x+5} = 6^{2x-7}$

e. $\frac{2}{4 - e^{-x/3}} = 1$

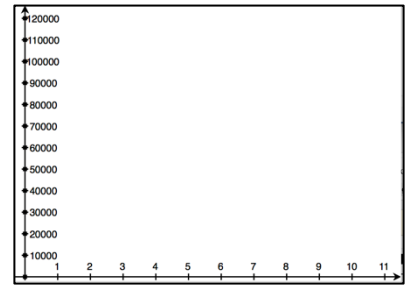
f. $8^{2x} - 6(8^x) = 27$

6. For most items, prices have gone up over time but for some products, they have decreased in price. The price of a 0.8 cubic foot (very small) microwave was \$250 in 1985. Its price has decreased by an average 8.5% every two years. During what year was the price of a comparable microwave \$100? What would be the cost in the year 2024? Show how you get your answers?
7. I take Xarelto, a blood thinner, which is necessary for patients with a heart arrhythmia. The medication's half-life is 50 hours. Because of a necessary operation, my doctor takes me off of Xarelto temporarily. The operation is safe to do when there is 20% or less of the Xarelto in my bloodstream. How many days must I be off Xarelto before the operation is safe to perform?
8. A patient's saliva is tested for Oxycodone, an opioid for pain. Currently, a sample of his saliva is 42% Oxycodone while 24 hours previous, it was 59%. What is the half-life for Oxycodone in saliva? What percent of the saliva sample is Oxycodone 48 hours previous?
9. A rumor at Hearsay High School is started by 2 students and grows exponentially. 12 minutes later, 15 students know the rumor. How long will it take for the entire population of Hearsay (1,250 students) to hear the rumor (nearest minute)?

1. A large company hires a number of IT specialists and pays them based on their years of experience and other factors. The table below gives this data.

Years Experience	1.1	1.5	2.2	3.2	3.2	4.0	5.1	6.8	7.9	8.2	9.6	10.3
Starting Salary	39,343	37,331	39,881	54,445	64,445	55,794	66,029	91,738	101,302	113,812	112,635	122,391

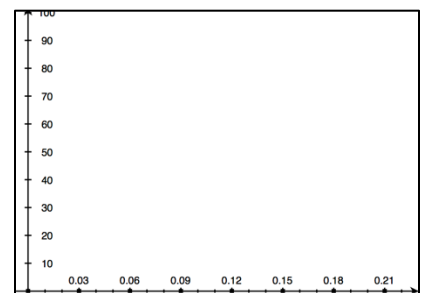
- a. Create a scatterplot and find the LSRL.
- b. Explain the meaning of the slope in the LSRL.
- c. What is the predicted salary for someone with 6 years of experience?
- d. What is the residual for the employee with 4 years of experience? Explain its meaning.
- e. What is the largest residual?



2. In 2007, a university study was published investigating the crash risk of alcohol impaired driving. Data from 2,871 crashes were used to measure the association of a person’s blood alcohol level (BAC) with the risk of being in an accident. The table shows results from the study. The relative risk is a measure of how many times more likely a person is to crash. So, for example, a person with a BAC of 0.09 is 3.54 times as likely to crash as a person who has not been drinking alcohol.

BAC	0	0.01	0.03	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.19	0.21
Relative Risk Of Crashing	1.00	1.03	1.06	1.38	2.09	3.54	6.41	12.60	22.10	39.05	65.21	99.78

- a. Create a scatterplot and a model. Explain why the model is appropriate.
- b. What is the predicted risk with a BAC of 0.12?
- c. What is the residual for a BAC of 0.09?



- d. If the relative risk of crashing is less than 4 times as likely as those who have not drunk alcohol, what is the expected BAC?

3. A minor-league baseball player takes part in an experiment. He takes batting practice and for all the balls he hits in the air, the angle the ball leaves his bat and the average distance in feet the ball travels are measured as shown in the table below.

Angle (deg)	5	10	15	20	25	30	35	40	45	50	55	60	65	70
Distance (ft)	85	116	157	189	221	254	269	283	285	277	251	231	180	140

- What is evidence that the distance a ball travels based on the angle is quadratic?
 - Find the model that predicts distance from angle:
 - Find the error in the model for a ball that leaves the bat at an angle of 25° .
 - The wall is 260 feet away from home plate and the fence is 10 feet high. Find the range of angles that would result in a home run.
4. A company by the name of Sturdy makes trash bags in different sizes. They are priced based on gallons that a filled bag could hold, which is a function of how much plastic is used in constructing the bag. The size and prices of a box containing the same number of bags is given in the table below.

Gallons (s)	2.6	8	13	30	50
Cost (C)	5.55	12.89	18.29	43.15	65.80

- a. Generate a linear regression model, an exponential model, and a quadratic model for diameter vs. cost.

Linear:

Exponential:

Quadratic:

- b. If Sturdy has two other sizes, 1.5 gallons and 75 gallons, how much does each model suggest they should charge for it?

Linear:

Exponential:

Quadratic:

- c. What is the residual for each model using a 13-gallon bag size?

Linear:

Exponential:

Quadratic:

- d. Which model makes the most sense and why?

5. Find an equation of the logarithmic function passing through points (4, 0) and (10, 6) and find the y -value for $x = 15$. Show the work involved in finding the equation.

6. There are varying methods for the best way to cook a sirloin roast. One school of thought is to use high heat for a short period of time and let the roast cool in the oven. Other methods are a longer time in a cooler oven and there are recipes for cooking the meat at very low heat for long periods. The table below gives a relationship between time in the oven and temperature Fahrenheit for various recipes.

Time (t)	1	1.5	2	5	8
Temperature °F (T)	500	450	375	175	150

- a. Generate a quadratic regression, exponential, and a logarithmic model for time vs temperature.

Quadratic:

Exponential:

Logarithmic:

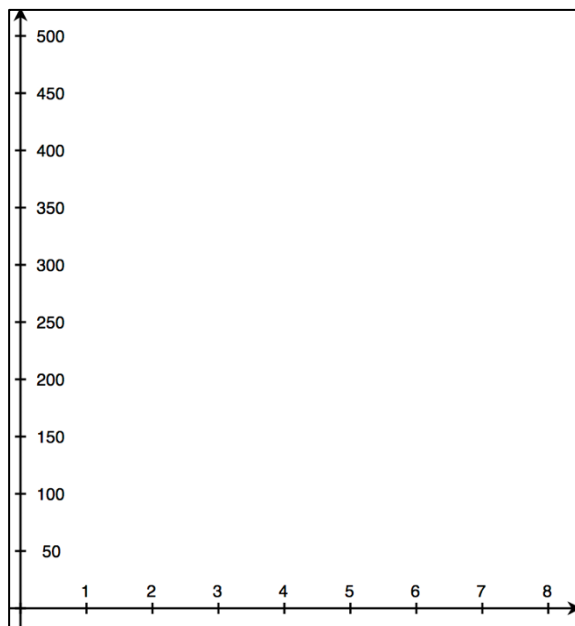
- b. What does each model suggest for cooking the roast for 3 hours (nearest degree)?

Quadratic:

Exponential:

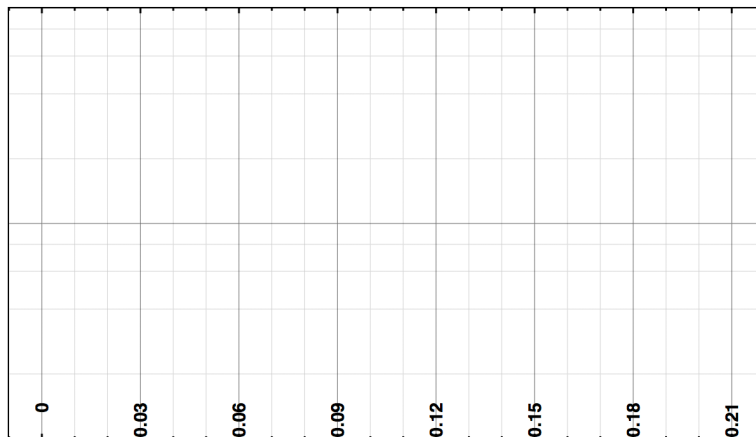
Logarithmic:

- c. Graph all 3 models and use them to explain the advantages and disadvantages of each.

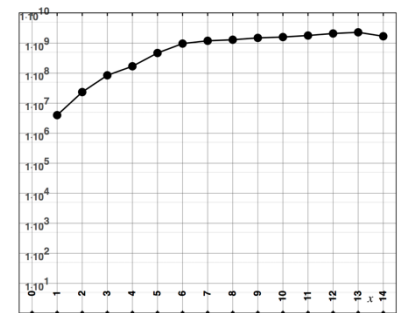


1. This is a repeat of a problem in a previous quiz. In 2007, a university study was published investigating the crash risk of alcohol impaired driving. Data from 2,871 crashes were used to measure the association of a person’s blood alcohol level (BAC) with the risk of being in an accident. The table shows results from the study. The relative risk is a measure of how many times more likely a person is to crash. So, for example, a person with a BAC of 0.09 is 3.54 times as likely to crash as a person who has not been drinking alcohol. Graph the data on a semi-log plot where you provide the y-axis scale.

BAC	0	0.01	0.03	0.05	0.07	0.09	0.11	0.13	0.15	0.17	0.19	0.21
Relative Risk Of Crashing	1	1.03	1.06	1.38	2.09	3.54	6.41	12.6	22.1	39.05	65.21	99.78



2. The figure to the right represents smartphone sales in the US on a semi-log graph with $x = 1$ corresponding to 2006. Estimate the following.



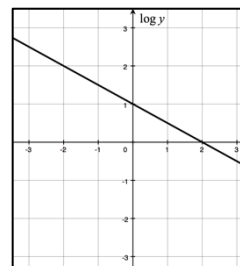
- How many more phones were sold in 2018 than in 2008?
- What is smartphone’s average growth rate over those years?
- Are phone sales growing faster between 2006 and 2007 or 2008 and 2009? Explain.

3. Express the exponential graph in logarithmic form so it can easily be graphed on an x -vs. $\log y$ scale.

3. Given the graph of $\log y$, generate the exponential equation in form $y = ab^x$.

a. $y = \frac{1}{2}(10^{x/5})$

b. $y = 0.7(3^{-x})$



AP Precalculus
Unit 2 Comprehensive Exam Part 1 (Calculator)

Name _____ Pd. _____

1. If $f(x) = \frac{3x-4}{5x+2}$, find $f^{-1}(1)$

A) $\frac{1}{7}$

B) 7

C) -7

D) -3

2. Find $\sum_{i=0}^6 (-1)^{i+1} (i^2 + i - 1)$

A) -21

B) -23

C) 21

D) 23

3. Find the value of $\log_{\frac{2}{3}} \frac{9}{8} - \log_{\frac{2}{3}} \frac{1}{2}$

A) -2

B) 2

C) $\frac{2}{3}$

D) $\frac{-3}{2}$

4. A sequence is given recursively as $a_1 = 2$, $a_n = a_{n-1} + 4n - 4$. Express the sequence explicitly.

A) $a_n = 2 + 4n$

B) $a_n = 4n - 2$

C) $a_n = 2(n^2 + n + 1)$

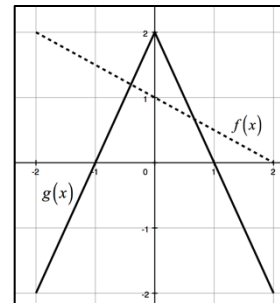
D) $a_n = 2(n^2 - n + 1)$

5. Given the graph of f and g in the figure to the right, place the following in descending order.

- I. $(g \circ f)(-2)$ II. $(f \circ g)(-2)$ III. $(f \circ g \circ g)(-1)$

- A) I, II, III
C) III, I, II

- B) III, II, I
D) II, III, I



6. Pauline has run out of ice and fills an ice tray with water at 72°F and places it in the freezer. Every 5 minutes, she checks on the water's temperature as shown by the table to the right. She uses exponential regression to determine an equation that fits and checks the tray at the time the cubes should be frozen 32°F . But the cubes are not completely solid so she decides to wait 10 minutes more. How much colder will the ice cubes be?

time (minutes)	5	10	15	20	25
Temperature	66	62	58	55	53

- A) 1.8°F B) 2.3°F C) 3.8°F D) 4.3°F

7. If an exponential curve passes through the points $(2, 36)$ and $(4, 16)$, find the value of y when $x = 3$.

- A) 27 B) 25 C) 24 D) 20

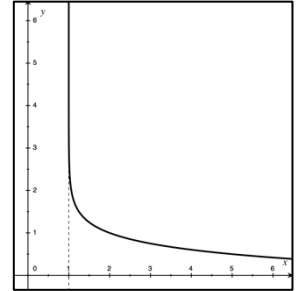
8. Describe the number and nature of zeros of $\frac{\log_2(x+3) - \log_2(x-3)}{\log_2 x} - 3$

- A) 2 rational B) 1 rational C) 2 irrational D) 2 imaginary

9. Let $f(x) = \frac{1}{x-1}$ and $g(x) = x+1$. If $f(g(x)) = g(f(x))$, then describe the number and nature of x -values.
- A) 1 rational B) 2 rational C) 2 irrational D) 2 imaginary

10. Which of the following choices could graph this function?

- A) $y = 1 - \frac{\log_4(x+1)}{2}$ B) $y = 1 - \frac{\log_4(x-1)}{2}$
- C) $y = -\frac{\log_4(x-1)}{2} - 1$ D) $y = \frac{\log_4(x+1)}{2} - 1$



11. Ian does 20 pushups the first day of the month and adds on 4 pushups each subsequent day. He quits when he reaches 100 pushups. Jay does 25 pushups the first day of the month and adds on 5 pushups each subsequent day. He quits when he reaches 100 pushups. What is the difference between their average number of pushups per day?

- A) 0 B) 1 C) 4.5 D) 5

12. If land worth W_0 dollars has a 300% increase in value every three years, which of the following is an expression that describes its worth after y years?

- A) $W(4)^{3y}$ B) $W(4)^{y/3}$ C) $W(3)^{3y}$ D) $W(3)^{y/3}$

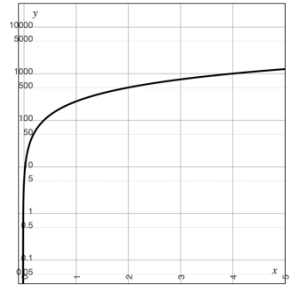
13. A function is graphed on a semi-log graph as shown to the right. Which of the following could be the function?

A) $y = 250x + 5$

B) $y = 5 + 250 \log(x + 1)$

C) $y = 4 + e^{x-1}$

D) none could be correct



14. If $4^{3x-4} = \left(\frac{1}{8}\right)^{2-x}$, find the value of 125^{-x}

A) $\frac{1}{25}$

B) -25

C) $\frac{2}{3}$

D) $\frac{1}{10}$

15. What is the value of $\frac{-3 \log_{16} 64}{2 \log_{64} 16}$

A) $\frac{-3}{2}$

B) $\frac{-27}{16}$

C) -1

D) 1

16. Ike and Mike each give their wives money for food shopping weekly. Ike initially gives \$400 and every week, that sum increases by 4%. Mike also initially gives \$400 but every week, that sum decreases by 4%. What is the difference between the amount that Ike's wife received and Mike's wife received over 8 weeks?

A) \$224

B) 256

C) \$673

D) \$900

17. Suppose $f(x) = \frac{x+2}{x-2}$ and $g(x) = \frac{5}{2x+1}$, what is the domain of $(g \circ f)(x)$

I. $x \neq 2$

II. $x \neq \frac{-1}{2}$

III. $x \neq \frac{-2}{3}$

A) I and II only

B) I and III only

C) II and III only

D) I, II and III

18. For consecutive integer values of x , the corresponding y -values are 3, 8, 16, 25, 37, 50. If regression was performed, which method would give the best fit?

A) linear

B) exponential

C) quadratic

D) logarithmic

19. A sum of money is invested for a given amount of time at a certain rate of interest and a certain compounding method. Given the following choices, which is the most amount of interest that could be gained?

A) \$500, 5 years,
4%, quarterly

B) \$1000, 6 years,
1.8%, daily

C) \$1200, 1.5 years,
5%, simple

D) \$750, 4 years,
3.5%, continuously

20. Which of the following statements is untrue?

A) $\log_3 9^x = 2x$

B) $9^{\log_9 \frac{1}{9}} = -9$

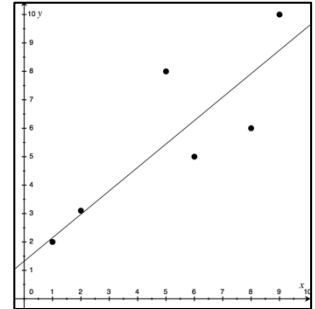
C) $-9 \log \sqrt{100} = -18$

D) $\frac{\ln \sqrt[4]{e}}{e^{\ln 4}} = \frac{1}{16}$

21. Shown are a series of points and their Least-Square Regression Line. How many of the data points have residuals greater than 0.5?

- A) 2
C) 4

- B) 3
D) 5



22. Solve $\frac{9}{2 + e^{-2x}} = 2$

A) $\frac{1}{2} e^{5/2}$

B) $\frac{-1}{2} e^{2/5}$

C) $\frac{1}{2} (\ln 2 - \ln 5)$

D) $\frac{1}{2} \ln \frac{5}{2}$

23. If $y = \frac{\log x - 1}{\log 2}$, find its inverse.

A) $y = 10(2^x)$

B) $y = 20^x$

C) $y = 2^{x+1}$

D) $x = 2^{x+1}$

24. A logarithmic curve passes through the points $(1,1)$, $(e, 3)$. What is the value of y when $x = 2e$.

A) $2 + 2\ln 2$

B) $3 + 2\ln 2$

C) 5

D) 6

25. A printer ink cartridge takes 75 ml of ink. However, since the cartridge is not transparent, there is no way to know visually exactly how much ink is in the cartridge. A manufacturer decides to lower the amount of ink inside a cartridge by 2% quarterly and does this for 3 years. What percentage (nearest percent) of ink did the cartridge lose by the end of that 3-year period?

A) 6%

B) 18%

C) 22%

D) 24%

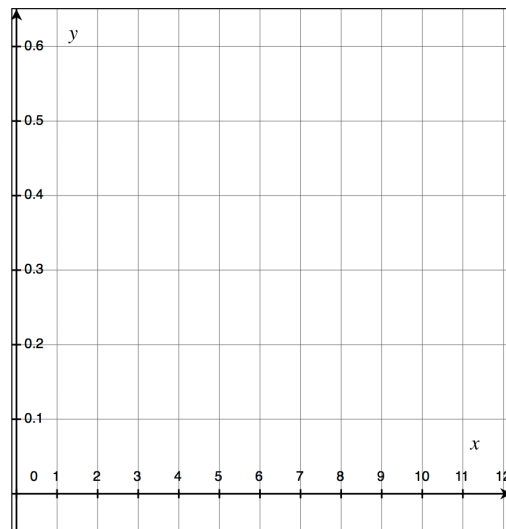
Unit 2 Comprehensive Exam Part 2 (Calculator Allowed)

1. While being monitored in the hospital, Jerry found at 8 AM that there was blood in his urine and output was 60% blood. His doctors immediately gave him an intravenous antibiotic and at 1 PM, the blood in his urine was down to 35%. Jerry took this to mean the antibiotic was working but the question remained is whether the blood in the urine was decreasing linearly or exponentially.

a) If x represents hours after 8 AM and y represents percent of urine in the blood, create a linear model for the given data.

b) If x represents hours after 8 AM and y represents percent of urine in the blood, create an exponential model for the given data.

c) Using the supplied axes, graph both the linear and exponential functions from 8 AM through 8 PM.



d) Jerry's doctors will not allow him to be discharged until they are sure that the antibiotics are working and the blood in the urine is down to 10% or less. Using both models, what is the earliest he could be discharged?

2. Let $f(x) = \frac{x-3}{x+1}$ and $g(x) = 4-3x$

a) Determine if $f(x)$ is a one-to-one function and give a reason.

b) Determine if $f(x^2)$ is a one-to-one function and give a reason.

c) Find $(f^{-1} \circ g^{-1})(-5)$

d) Show that $(f \circ f^{-1}) = x$

e) Find $(f \circ g)^{-1}$

3. Diet Lo-Down guarantees a customer will lose 2% of his body weight every month and a half if he follows the eating and exercising regimen exactly.
- a) Write an expression that describes a person's weight m months after starting diet Lo-Down if he initially weighs W_0 pounds.
- b) Use your answer in a) to predict the weight of a 350-pound person who follows diet Lo-Down for 9 months.
- c) Betsy has a goal of getting down to 125 pounds and is willing to spend a year on diet Lo-Down. Show work to determine the heaviest she could be at the time of starting the diet.
- d) Marketers for diet Lo-Down wish to advertise that a person, no matter how much he weighs, could lose 25% of his body weight if he follows diet Lo-Down for 2 years. Based on the claims of the effectiveness of the diet, is this true? Show mathematically how you come to your conclusion.
- e) George goes on diet Lo-Down for 6 months. At the end of that times, he gives up the diet and starts to gain back the weight. He gains 2% of his body weight every month. How long will it take him to get back to his orginal weight, no matter what that original weight was? Justify your answer.