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Instructor: Sumithra Iyer

Assignment: 2.3

Date: 07/11/19

Course: 1325 Summer 2- 2019

1. Use the linear equation $y = \frac{5}{9}(x - 32)$, where x is the degrees Fahrenheit and y is the degrees Celsius, to convert each temperature.

(a) 64°C to Fahrenheit(b) 40°F to Celsius(a) $64^{\circ}\text{C} =$ _____ $^{\circ}\text{F}$

(Round to one decimal place as needed.)

(b) $40^{\circ}\text{F} =$ _____ $^{\circ}\text{C}$

(Round to one decimal place as needed.)

2. The Consumer Price Index (CPI), which measures the cost of a typical package of consumer goods, was 210.8 in 2011 and 243.3 in 2016. Let $x = 11$ correspond to the year 2011 and estimate the CPI in 2012 and 2015. Assume that the data can be modeled by a straight line and that the trend continues indefinitely. Use two data points to find such a line and then estimate the requested quantities.

Let y represent the CPI. The linear equation that best models the CPI is _____.

(Simplify your answer. Use integers or decimals for any numbers in the equation. Round to the nearest hundredth as needed.)

In 2012, the CPI would be _____.

(Type an integer or a decimal rounded to the nearest hundredth as needed.)

In 2015, the CPI would be _____.

(Type an integer or a decimal rounded to the nearest hundredth as needed.)

3. Assume that the data can be modeled by a straight line and that the trend continues indefinitely. Use two data points to find such a line and then answer the question.

Suppose a baseball is thrown at 82 miles per hour. The ball will travel 350 feet when hit by a bat swung at 48 miles per hour and will travel 515 feet when hit by a bat swung at 81 miles per hour. Let y be the number of feet traveled by the ball when hit by a bat swung at x miles per hour. How much farther will a ball travel for each mile-per-hour increase in the speed of the bat?

A ball will travel _____ feet farther for each mile-per-hour increase in the speed of the bat.

(Type a whole number.)

4. The following table shows the estimated sales (in billions of dollars) for a certain company for several years. Let $x = 6$ correspond to the year 2006. Two equations that model these data are $y = 0.42x + 0.47$ and $y = 0.58x - 0.89$. Complete parts (a) through (c) below.

Year	2006	2008	2010	2012	2014
Sales	2.8	3.3	4.8	6.3	6.8

(a) Find the residuals and their sum for each model.

Find the residuals for the first model, $y = 0.42x + 0.47$.

Year	2006	2008	2010	2012	2014
Residual					

(Type integers or decimals.)

The sum of the residuals for $y = 0.42x + 0.47$ is _____.

(Type an integer or a decimal.)

Find the residuals for the second model, $y = 0.58x - 0.89$.

Year	2006	2008	2010	2012	2014
Residual					

(Type integers or decimals.)

The sum of the residuals for $y = 0.58x - 0.89$ is _____.

(Type an integer or a decimal.)

(b) Find the sum of the squares of the residuals for each model.

The sum of the squares of the residuals for $y = 0.42x + 0.47$ is _____.

(Round the final answer to two decimal places as needed. Round all intermediate values to two decimal places as needed.)

The sum of the squares of the residuals for $y = 0.58x - 0.89$ is _____.

(Round the final answer to two decimal places as needed. Round all intermediate values to two decimal places as needed.)

(c) Decide which model is the better fit.

The model (1) _____ is the better fit because the equation of the line that has the (2) _____

(3) _____ is the better fit.

(1) ☐ $y = 0.42x + 0.47$ (2) ☐ smaller (3) ☐ sum of the squares of the residuals

☐ $y = 0.58x - 0.89$ ☐ larger ☐ sum of the residuals

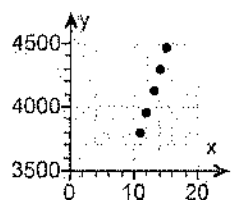
5. Determine whether a straight line is a good model for the data. Do this visually by plotting the data points and by finding the correlation coefficient for the least-squares regression line.

The following table shows the number of operating federal credit unions in a certain country for several years. Let $x = 11$ correspond to the year 2011.

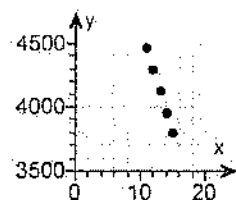
Year	2011	2012	2013	2014	2015
Number of federal credit unions	4476	4300	4132	3956	3790

Which graph below shows the data?

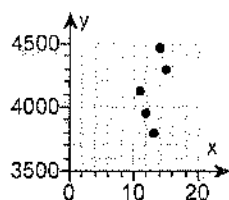
A.



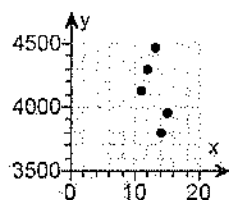
B.



C.



D.



The correlation coefficient is -1.000 .
(Round to three decimal places as needed.)

A straight line is a good fit for the data because the data points roughly form a straight line and the correlation coefficient is near -1 .

YOU ANSWERED: 72

6. The total amount of construction spending on highways and streets (in billions of dollars) is given in the accompanying table for the first six months of 2016.

Month	January	February	March	April	May	June
Spending	97	95	89	83	73	73

- (a) Find the least-squares regression line that models these data, with $x = 1$ corresponding to January 2016.
(b) Assuming the trend continues, estimate the amount of spending in December 2016.

(a) The linear model for the data is $y = (\text{ })x + (\text{ })$.
(Round to the nearest thousandth as needed.)

(b) The amount of spending in December is approximately \$ billion.
(Round to the nearest tenth as needed.)

7. During the summer, Rafael's Toy Shop collects data that implies a relationship between the weekly average temperature and the number of kites sold.

Weekly Temp °F (x)	Kites Sold (y)
77.0	13
74.3	12
80.6	14
81.7	14
80.3	14
74.3	11

Choose the correct equation for the least squares line.

- ☐ A. $y = 15.41x - 0.364$ ☐ B. $y = 0.364x + 15.41$ ☐ C. $y = 0.364x - 15.41$

During a week with an average temperature of 65.3°F , how many kites can Rafael expect to sell? _____ kites
(Round to the nearest whole number as needed.)

During a week in which Rafael sells 9 kites, what will be the approximate average temperature? _____ $^{\circ}\text{F}$
(Round to the nearest tenth as needed.)

The coefficient of correlation is _____.
(Round to the nearest thousandth as needed.)

5. Graph the function. Give the equations of the vertical and horizontal asymptotes.

$$f(x) = \frac{x^2 + 9}{x^2 - 25}$$

Give the equations of any vertical asymptotes for the graph of the rational function. Select the correct choice below and fill in any answer boxes within your choice.

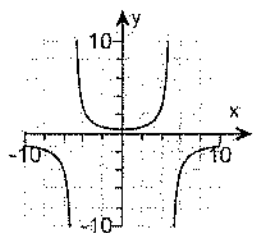
- ☐ A. The function has two vertical asymptotes. The leftmost asymptote is _____ and the rightmost asymptote is _____.
(Simplify your answer. Type an equation.)
- ☐ B. The function has one vertical asymptote, _____.
(Simplify your answer. Type an equation.)
- ☐ C. There is no vertical asymptote.

Give the equations of any horizontal asymptotes for the graph of the rational function. Select the correct choice below and fill in any answer boxes within your choice.

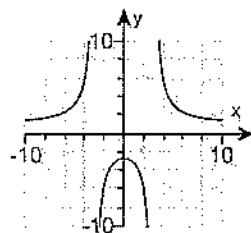
- ☐ A. $y =$ _____
(Simplify your answer. Use a comma to separate answers as needed.)
- ☐ B. There is no horizontal asymptote.

Choose the correct graph below.

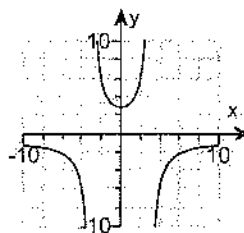
☐ A.



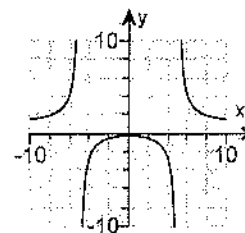
☐ B.



☐ C.



☐ D.



6. Find the equation(s) of the vertical asymptote(s) of the given rational function.

$$f(x) = \frac{x + 3}{x^2 - 25}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The function has two vertical asymptotes. The leftmost asymptote is _____ and the rightmost asymptote is _____.
(Simplify your answers. Type equations.)
- ☐ B. The function has one vertical asymptote, _____.
(Simplify your answer. Type an equation.)
- ☐ C. There is no vertical asymptote.

7. Find the equation(s) of the vertical asymptote(s) of the given rational function.

$$f(x) = \frac{x^2 + 7x}{x^2 - 2x - 8}$$

Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ☐ A. The function has two vertical asymptotes. The leftmost asymptote is _____ and the rightmost asymptote is _____.
(Simplify your answers. Type equations.)
- ☐ B. The function has one vertical asymptote, _____.
(Simplify your answer. Type an equation.)
- ☐ C. There is no vertical asymptote.

8. Suppose a cost-benefit model is given by

$$y = \frac{6.7x}{100 - x}$$

where x is a number of percent and y is the cost, in thousands of dollars, of removing x percent of a given pollutant. Complete parts a through c.

- a. Find the cost of removing each percent of pollutants: 50%; 70%; 80%; 90%; 95%; 98%; 99%.

50%	$y =$ _____	70%	$y =$ _____
80%	$y =$ _____	90%	$y =$ _____
95%	$y =$ _____	98%	$y =$ _____
99%	$y =$ _____		

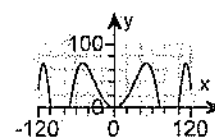
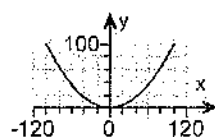
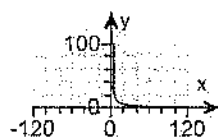
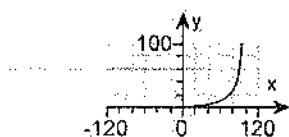
(Type an integer or decimal rounded to two decimal places as needed.)

- b. Is it possible, according to this function, to remove all the pollutant?

- ☐ Yes
☐ No

- c. Graph the function. Choose the correct graph below.

- ☐ A. ☐ B. ☐ C. ☐ D.



9. When no more than 110 units are produced, the cost of producing y units is given by $C(x)$.

$$C(x) = 0.2x^3 - 23x^2 + 1501x + 37,098$$

How many units should be produced in order to have the lowest possible average cost?

_____ units should be produced.
(Round to one decimal place as needed.)

6

If $f(x) = a^x$ and $f(2) = 9$, find $f(3)$. Assume $a > 0$.

$f(3) =$ _____

7

If \$1 dollar is deposited in an account paying 24% per year compounded annually, then after t years the account will contain $y = (1 + 0.24)^t = 1.24^t$ dollars.

(a) Use a calculator to complete the table.

(b) Graph 1.24^t .

(a) Use a calculator to complete the table.

t	1	2	3	4	5	6
y	1.24	1.54				2.933,64

(Round to two decimal places as needed.)

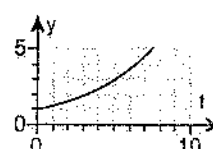
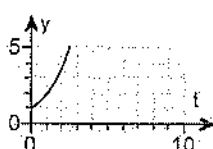
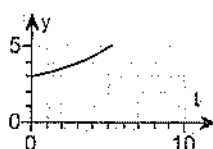
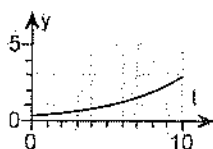
(b) Graph $y = 1.24^t$.

☐ A.

☐ B.

☐ C.

☐ D.



8

The scrap value of a machine at the end of its useful life is given by $S(n) = C(1 - r)^n$, where C is the original cost, n is the useful life of the machine in years, and r is the constant annual percentage of value lost. Find the scrap value of the following machine.

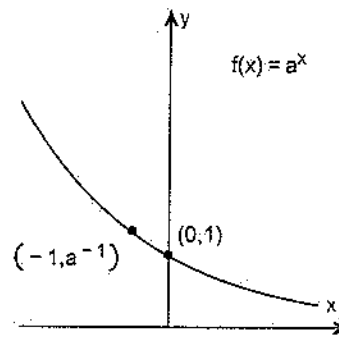
Original cost, \$52,000; life, 8 years; annual rate of value lost, 9%

$S = \$$ _____

(Round to the nearest cent.)

9.

The graph of an exponential function $f(x)$ with base a is shown to the right.



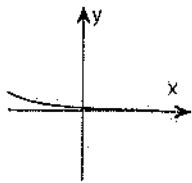
- (a) Is $a > 1$ or is $0 < a < 1$?
- (b) Give the domain and range of f .
- (c) Sketch the graph of $g(x) = a^x + 5$.
- (d) Give the domain and range of g .
- (e) Sketch the graph of $h(x) = a^{x+2}$.
- (f) Give the domain and range of h .

(a) Since the graph shows exponential decay, the values of a are in the range $0 < a < 1$.

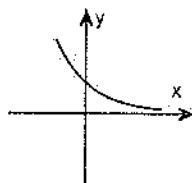
(b) The domain of f is _____ and the range is _____.
(Type your answer in interval notation.)

(c) Which graph below is the graph of $g(x) = a^x + 5$?

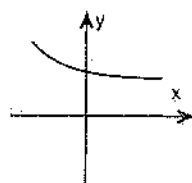
☐ A.



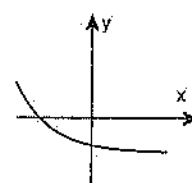
☐ B.



☐ C.



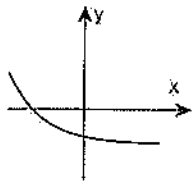
☐ D.



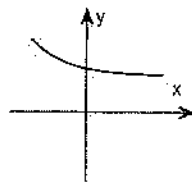
(d) The domain of g is _____ and the range is _____.
(Type your answer in interval notation.)

(e) Which graph below is the graph of $h(x) = a^{x+2}$?

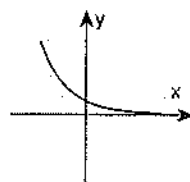
☐ A.



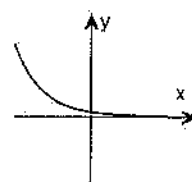
☐ B.



☐ C.



☐ D.



(f) The domain of h is _____ and the range is _____.
(Type your answer in interval notation.)

Student: Maria Saenz
Date: 07/11/19

Instructor: Sumithra Iyer
Course: 1325 Summer 2- 2019

Assignment: 4.3

1. Translate the logarithmic statement into an equivalent exponential statement.

$$\log 0.0001 = -4$$

The equivalent exponential equation is _____.
(Use integers or decimals for any numbers in the equation.)

2. Translate the logarithmic statement into an equivalent exponential statement.

$$\log_5 25 = 2$$

The equivalent exponential equation is _____.
(Use integers or decimals for any numbers in the equation.)

3. Translate the exponential statement into an equivalent logarithmic statement.

$$e^{3.0910} = 22$$

The equivalent logarithmic equation is _____.
(Use integers or decimals for any numbers in the equation.)

4. Convert to a logarithmic equation.

$$4^{-3} = \frac{1}{64}$$

The equivalent logarithmic equation is _____.
(Use integers or fractions for any numbers in the equation.)

5. Evaluate the expression without using a calculator.

$$\log (0.1)$$

$$\log (0.1) = \underline{\hspace{2cm}}$$

6. Evaluate the expression without using a calculator.

$$\log_4 64$$

$$\log_4 64 = \underline{\hspace{2cm}}$$

7. Find the value of the logarithm.

$$\ln (e)$$

$$\ln (e) = \underline{\hspace{2cm}}$$

8. Use a calculator to find the natural logarithm, base e .

$$\ln (0.58)$$

$$\ln (0.58) = \underline{\hspace{2cm}}$$

(Round to 4 decimal places.)

9. Write the expression as a logarithm of a single expression.

$$\log 9 + \log 35 - \log 7$$

$$\log 9 + \log 35 - \log 7 = \log \underline{\hspace{2cm}} \quad (\text{Simplify your answer.})$$

10. Write the expression as the logarithm of a single number or expression. Assume that all variables represent positive numbers.

$$5 \log x - 2 \log y$$

$$5 \log x - 2 \log y = \underline{\hspace{2cm}}$$

11. Write the expression as the logarithm of a single number or expression. Assume that all variables represent positive numbers.

$$3 \log x + 4 \log y - 2 \log z$$

$$3 \log x + 4 \log y - 2 \log z = \underline{\hspace{2cm}}$$

12. Write the expression as a sum and/or difference of logarithms, with all variables to the first degree.

$$\ln \sqrt{15w^5z^3}$$

$$\ln \sqrt{15w^5z^3} = \underline{\hspace{2cm}}$$

(Type an exact answer in simplified form. Use integers or fractions for any numbers in the expression.)

13. Write the expression as a sum and/or difference of logarithms with all variables to the first degree.

$$\ln \left(\frac{3y}{7z} \right)$$

$$\ln \left(\frac{3y}{7z} \right) = \underline{\hspace{2cm}}$$

14. Express the expression in terms of u and v , where $u = \ln k$ and $v = \ln m$.

$$\ln \left(\frac{k^7}{m^8} \right)$$

$$\ln \left(\frac{k^7}{m^8} \right) = \underline{\hspace{2cm}} \text{ (Simplify your answer.)}$$

15. Evaluate the expression.

$$\log_6 399$$

$$\log_6 399 = \underline{\hspace{2cm}}$$

(Simplify your answer. Type an integer or decimal rounded to six decimal places as needed.)

16. Evaluate the expression.

$$\log_{47} 2635$$

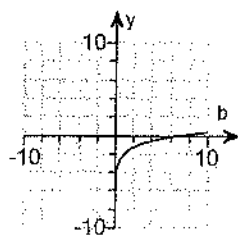
$$\log_{47} 2635 \approx \underline{\hspace{2cm}}$$

(Simplify your answer. Type an integer or decimal rounded to six decimal places as needed.)

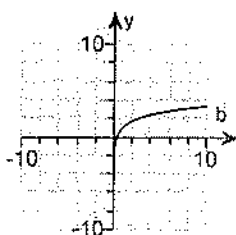
17 Graph the function $f(b) = \ln b - 2$.

Choose the correct graph below.

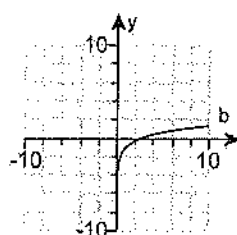
☐ A.



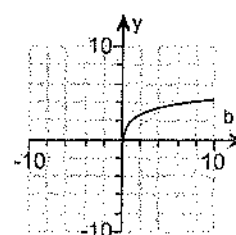
☐ B.



☐ C.



☐ D.



18 The average annual cost (in dollars) for health insurance in a country can be approximated by the function $g(x) = -1736.9 + 1661.3 \ln x$, where $x=6$ corresponds to the year 2006.

(a) Estimate the average cost in 2010.

(b) Graph the function g for the period 2006 to 2015

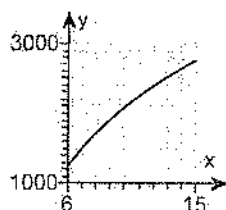
(c) Assuming that the graph remains accurate, what does the shape of the graph suggest regarding the average cost of health insurance?

(a) To find the average cost in 2010, substitute _____ for x in the function.
(Simplify your answer.)

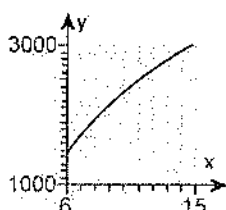
The average cost in 2010 was \$ _____.
(Round to two decimal places as needed.)

(b) Choose the correct graph below for the function $g(x)$.

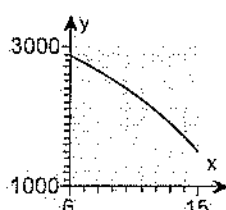
☐ A.



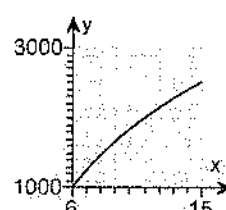
☐ B.



☐ C.



☐ D.



(c) Choose the sentence below that best describes this model.

- ☐ A. The average cost decreases at a faster rate as time goes on.
- ☐ B. The average cost decreases at a slower rate as time goes on.
- ☐ C. The average cost increases at a faster rate as time goes on.
- ☐ D. The average cost increases at a slower rate as time goes on.