

Practice Exam 3 #1

Student Name: _____

Number of Questions: **46**

Instructor Name: **Sizemore, Cristina**

Question 1 of 46

Evaluate the function for the given values of x . Round to 4 decimal places.

$$f(x) = e^x$$

(a) $f(-3)$

(b) $f(4.6)$

(c) $f(\sqrt{13})$

(d) $f(\pi)$

Part 1 of 4

$$f(-3) = \underline{\hspace{2cm}}$$

Part 2 of 4

$$f(4.6) = \underline{\hspace{2cm}}$$

Part 3 of 4

$$f(\sqrt{13}) = \underline{\hspace{2cm}}$$

Part 4 of 4

$$f(\pi) = \underline{\hspace{2cm}}$$

Question 2 of 46

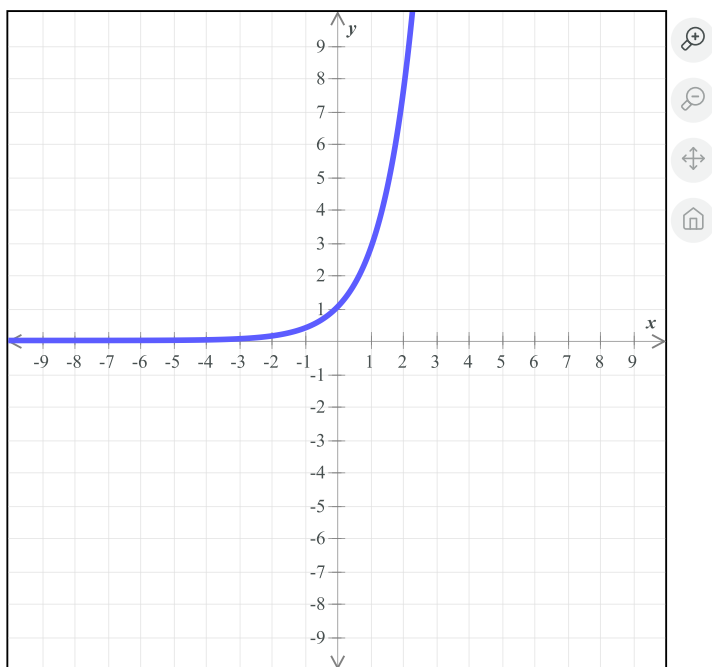
Use the function below to answer the following questions.

$$k(x) = e^x + 2$$

- (a) Use transformations of the graph of $y = e^x$ to graph the given function.
- (b) Write the domain and range in interval notation.
- (c) Write an equation of the asymptote.

Part 1 of 3

- (a) Use transformations of the graph of $y = e^x$ to graph the given function.



Part 2 of 3

- (b) Write the domain and range in interval notation.

The domain of the function k is _____.

The range of the function k is _____.

(c) Write an equation of the asymptote.

The equation of the horizontal asymptote is _____.

Question 3 of 46

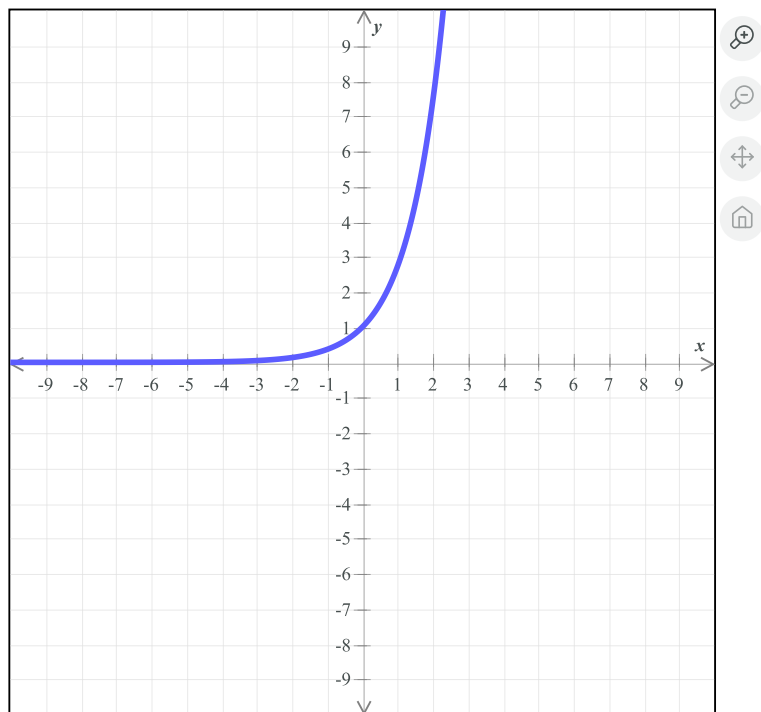
Use the function below to answer the following questions.

$$n(x) = -e^x - 1$$

- (a) Use transformations of the graph of $y = e^x$ to graph the given function.
- (b) Write the domain and range in interval notation.
- (c) Write an equation of the asymptote.

Part 1 of 3

- (a) Use transformations of the graph of $y = e^x$ to graph the given function $n(x) = -e^x - 1$.



Part 2 of 3

- (b) Write the domain and range in interval notation.

The domain of the function n is _____.

The range of the function n is _____.

(c) Write an equation of the asymptote.

The equation of the horizontal asymptote is _____.

Question 4 of 46

Which of the following are exponential functions?

- (a) $f(x) = (\sqrt{4.5})^x$ (b) $t(x) = (-4.3)^x$ (c) $h(x) = 4.7^x$
(d) $n(x) = x^5$ (e) $m(x) = 4.6x$

- ☐ (a) $f(x) = (\sqrt{4.5})^x$
☐ (b) $t(x) = (-4.3)^x$
☐ (c) $h(x) = 4.7^x$
☐ (d) $n(x) = x^5$
☐ (e) $m(x) = 4.6x$

Question 5 of 46

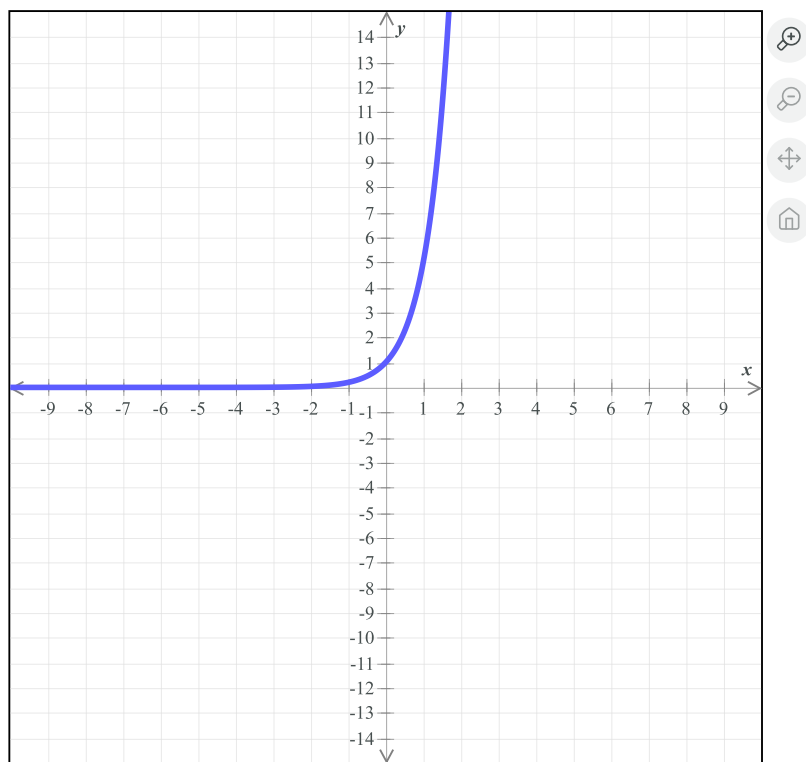
Use the function below to answer the following questions.

$$f(x) = 5^x - 4$$

- (a) Use transformations of the graph of $y = 5^x$ to graph the given function.
- (b) Write the domain and range in interval notation.
- (c) Write an equation of the asymptote.

Part 1 of 3

- (a) Use transformations of the graph of $y = 5^x$ to graph the given function.



Part 2 of 3

- (b) Write the domain and range in interval notation.

The domain of the function f is _____.

The range of the function f is _____.

(c) Write an equation of the asymptote.

The equation of the horizontal asymptote is _____.

Question 6 of 46

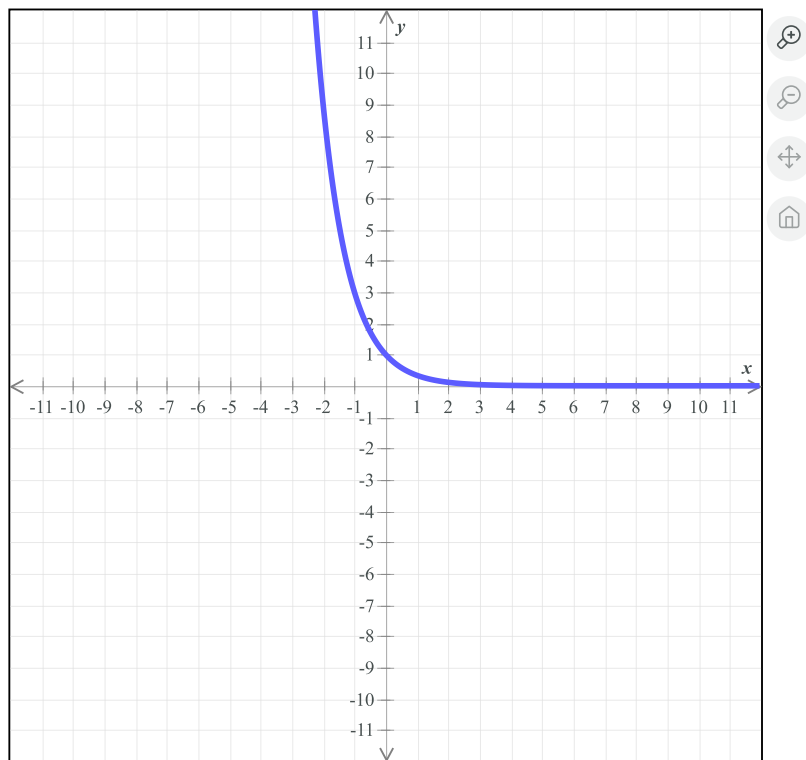
Use the function below to answer the following questions.

$$g(x) = \left(\frac{1}{3}\right)^{x-2} + 3$$

- (a) Use transformations of the graph of $y = \left(\frac{1}{3}\right)^x$ to graph the given function.
- (b) Write the domain and range in interval notation.
- (c) Write an equation of the asymptote.

Part 1 of 3

- (a) Use transformations of the graph of $y = \left(\frac{1}{3}\right)^x$ to graph the given function.



Part 2 of 3

(b) Write the domain and range in interval notation.

The domain of the function g is _____.

The range of the function g is _____.

Part 3 of 3

(c) Write an equation of the asymptote.

The equation of the horizontal asymptote is _____.

Question 7 of 46

Aniyah needs to borrow \$12,000. The money can be borrowed at 4.5% simple interest for 3 yr or borrowed at 4% with interest compounded continuously for 3 yr.

- (a) How much total interest would Aniyah pay at 4.5% simple interest?
- (b) How much total interest would Aniyah pay at 4% interest compounded continuously?
- (c) Which option results in less total interest?

Part 1 of 3

(a) How much total interest would Aniyah pay at 4.5% simple interest?

At 4.5% simple interest, the total interest Aniyah would pay is \$ _____ .

Part 2 of 3

(b) How much total interest would Aniyah pay at 4% interest compounded continuously? Round to the nearest cent.

At 4% interest compounded continuously, the total interest Aniyah would pay is \$ _____ .

Part 3 of 3

(c) Which option results in less total interest?

_____ results in less total interest.
(Blank 1.)

Blank 1, Options

- 4.5% simple interest for 3 yr
- 4% interest compounded continuously for 3 yr

Question 8 of 46

Write the equation in exponential form.

$$\log_2 512 = 9$$

The equation in exponential form is .

Question 9 of 46

Write the equation in exponential form.

$$\log\left(\frac{1}{100,000}\right) = -5$$

The equation in exponential form is .

Question 10 of 46

Write the equation in logarithmic form.

$$2^2 = 4$$

The equation in logarithmic form is .

Question 11 of 46

Simplify the expression without using a calculator.

$$\log_5 25 = \boxed{}$$

Question 12 of 46

Simplify the expression without using a calculator.

$$\log\left(\frac{1}{1000}\right) = \boxed{}$$

Question 13 of 46

Simplify the expression without using a calculator.

$$\log_{\pi} 1 = \underline{\hspace{2cm}}$$

Question 14 of 46

Use the product property of logarithms to write the logarithm as a sum of logarithms. Then simplify if possible. Assume that the variable represents a positive real number.

$$\log_5(125q)$$

$$\log_5(125q) = \underline{\hspace{2cm}}$$

Question 15 of 46

Use the quotient property of logarithms to write the logarithm as a difference of logarithms. Then simplify if possible.

$$\ln\left(\frac{e}{11}\right)$$

Part 1 of 3

First, use the _____.

(Blank 1,)

Blank 1, Options

power property of logarithms
product property of logarithms
quotient property of logarithms

Part 2 of 3

$$= \ln \underline{\hspace{1cm}} \underline{\hspace{1cm}} \ln \underline{\hspace{1cm}}$$

(Blank 1,)

Blank 1, Options

+

—

Part 3 of 3

Simplify.

$$= \underline{\hspace{1cm}} - \ln 11$$

Question 16 of 46

Use the quotient property of logarithms to write the logarithm as a difference of logarithms. Then simplify if possible. Assume that all variable expressions represent positive real numbers.

$$\log\left(\frac{p^3 + q}{100}\right)$$

$$\log\left(\frac{p^3 + q}{100}\right) = \underline{\hspace{2cm}}$$

Question 17 of 46

Write the logarithm as a sum or difference of logarithms. Simplify each term as much as possible. Assume that the variables represent positive real numbers.

$$\ln\left(\frac{\sqrt[5]{ab}}{(cd)^2}\right)$$

Part 1 of 6

First, apply the _____.

(Blank 1,)

Blank 1, Options

- quotient property of logarithms
- power property of logarithms
- product property of logarithms

Part 2 of 6

$$= \ln \sqrt[5]{ab} \text{ _____ } \ln (cd)^2$$

(Blank 1,)

Blank 1, Options

- +
-

Part 3 of 6

Write the radical expression with a rational exponent.

$$= \ln (ab)^{1/5} - \ln (cd)^2$$

Then, apply the _____.

(Blank 1,)

Blank 1, Options

quotient property of logarithms

power property of logarithms

product property of logarithms

Part 4 of 6

$$= \underline{\hspace{1cm}} \ln(ab) - \underline{\hspace{1cm}} \ln(cd)$$

Part 5 of 6

Apply the product property of logarithms.

$$= \frac{1}{5} (\underline{\hspace{1cm}}) - 2 (\underline{\hspace{1cm}})$$

Part 6 of 6

Apply the distributive property.

$$\text{Thus, } \ln \left(\frac{\sqrt[5]{ab}}{(cd)^2} \right) = \underline{\hspace{2cm}}.$$

Question 18 of 46

Write the logarithmic expression as a single logarithm with coefficient 1, and simplify as much as possible. Assume that the variables represent positive real numbers.

$$4\log_5 u - 2\log_5 v - 3\log_5 w$$

$$4\log_5 u - 2\log_5 v - 3\log_5 w = \underline{\hspace{2cm}}$$

Question 19 of 46

Solve the equation.

$$7^x = 49$$

The solution set is .

Question 20 of 46

Solve the equation.

$$\sqrt{6} = 6^a$$

The solution set is .

Question 21 of 46

Solve the equation. Write the solution set with the exact values given in terms of common or natural logarithms. Also give approximate solutions to at least 4 decimal places.

$$858 = 11^t + 5$$

- ☐ There is no solution, $\{\}$.
- ☐ The exact solution set is $\{ \underline{\hspace{2cm}} \}$.

$t \approx \underline{\hspace{2cm}}$

Question 22 of 46

Solve the equation. Write the solution set with the exact solutions.

$$\log_4(z + 18) = \log_4(10 - z)$$

- ☐ There is no solution, $\{\}$.
- ☐ The exact solution set is $\underline{\hspace{2cm}}$.

Question 23 of 46

Solve the equation. Write the solution set with the exact solutions.

$$6\log_2(4p - 8) - 8 = 16$$

- ☐ There is no solution, $\{\}$.
- ☐ The exact solution set is $\underline{\hspace{2cm}}$.

Question 24 of 46

Use the model $A = Pe^{rt}$ or $A = P\left(1 + \frac{r}{n}\right)^{nt}$, where A is the future value of P dollars invested at interest rate r compounded continuously or n times per year for t years.

If a couple has \$200,000 in a retirement account, how long will it take the money to grow to \$1,000,000 if it grows by 6% compounded continuously? Round to the nearest year.

It will take approximately _____ years.

Question 25 of 46

Caffeine occurs naturally in a variety of food products such as coffee, tea, and chocolate. The kidneys filter the blood and remove caffeine and other drugs through urine. The biological half-life of caffeine is approximately 6 hours. If one cup of coffee has 100 mg of caffeine, then the amount of caffeine C (in mg) remaining after t hours is given by $C = 100(2)^{-t/6}$.

- (a) How long will it take for the amount of caffeine to drop below 80 mg? Round to 1 decimal place.
- (b) Laura has trouble sleeping if she has more than 50 mg of caffeine in her bloodstream. How many hours before going to bed should she stop drinking coffee? Round to 1 decimal place, if necessary.

Part 1 of 2

(a) It will take approximately _____ hour(s) for the amount of caffeine to drop below 80 mg.

Part 2 of 2

(b) Laura should stop drinking coffee approximately _____ hour(s) before going to bed.

Question 26 of 46

Forge welding is a process in which two pieces of steel are joined together by heating the pieces of steel and hammering them together. A welder takes a piece of steel from a forge at 1610°F and places it on an anvil where the outdoor temperature is 60°F . The temperature of the steel T (in $^{\circ}\text{F}$) can be modeled by

$T = 60 + 1550e^{-0.05t}$, where t is the time in minutes after the steel is removed from the forge. How long will it take for the steel to reach a temperature of 110°F so that it can be handled without heat protection?

Round to the nearest minute.

It will take _____ minutes for the steel to reach a temperature of 110°F .

Question 27 of 46

Solve the system of equations by using the substitution method.

$$2x + y = 14$$

$$3x + 2y = 25$$

The solution set is $\{ \text{_____} \}$.

Question 28 of 46

Solve the system by using any method. If a system does not have one unique solution, state whether the system is inconsistent or whether the equations are dependent.

$$-3x - 6y = 7$$

$$6x = 8 - 12y$$

- ☐ The system has one solution.

The solution set is $\{ \underline{\hspace{1cm}} \}$.

- ☐ The system has no solution, $\{\}$.

☐ The system is inconsistent.

☐ The equations are dependent.

- ☐ The system has infinitely many solutions.

The solution set is $\{ \underline{\hspace{1cm}} \mid x \text{ is any real number} \}$.

☐ The system is inconsistent.

☐ The equations are dependent.

Question 29 of 46

Michelle borrows a total of \$7000 in student loans from two lenders. One charges 3.8% simple interest and the other charges 5.8% simple interest. She is not required to pay off the principal or interest for 4 yr. However, at the end of 4 yr, she will owe a total of \$1224 for the interest from both loans. How much did she borrow from each lender?

Part 1 of 2

Michelle borrowed \$ _____ at 3.8%.

Part 2 of 2

Michelle borrowed \$ _____ at 5.8%.

Question 30 of 46

Solve the system. If the system has one unique solution, write the solution set. Otherwise, determine the number of solutions to the system, and determine whether the system is inconsistent, or the equations are dependent.

$$4x - 3y + 4z = 1$$

$$-3x + 3y + 8z = 22$$

$$-5x + 4y - 4z = 1$$

- ☐ The system has one solution.

The solution set is $\left\{ \left(\underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} \right) \right\}$.

- ☐ The system has no solution.
- ☐ The system is inconsistent.
 - ☐ The equations are dependent.
- ☐ The system has infinitely many solutions.
- ☐ The system is inconsistent.
 - ☐ The equations are dependent.

Question 31 of 46

Write the augmented matrix for the given system. The rows of the augmented matrix should be in the same order as the equations in the given system.

$$6x + 2y - 3z = -1$$

$$9x \quad \quad + 4z = -8$$

$$4y - 4z = -4$$

Augmented matrix:

[

Question 32 of 46

Determine if the matrix is in row-echelon form. If not, explain why.

$$\left[\begin{array}{cc|c} 1 & 2 & -1 \\ 0 & 9 & 7 \end{array} \right]$$

- ☐ The matrix is in row-echelon form.
- ☐ The matrix is not in row-echelon form.

In order for the matrix to be in row-echelon form, the element in row , column must be .

Question 33 of 46

Determine if the matrix is in row-echelon form. If not, explain why.

$$\left[\begin{array}{ccc|c} 1 & -9 & -4 & 3 \\ 0 & 1 & 0 & -7 \\ 0 & -9 & 1 & -7 \end{array} \right]$$

- ☐ The matrix is in row-echelon form.
- ☐ The matrix is not in row-echelon form.

In order for the matrix to be in row-echelon form, the element in row , column must be .

Question 34 of 46

Determine if the matrix is in row-echelon form. If not, explain why.

$$\left[\begin{array}{cc|c} 1 & 7 & -8 \\ 0 & -5 & -6 \end{array} \right]$$

- ☐ The matrix is in row-echelon form.
- ☐ The matrix is not in row-echelon form.

In order for the matrix to be in row-echelon form, the element in row , column must be .

Question 35 of 46

Solve the system by using Gaussian elimination or Gauss-Jordan elimination.

$$-4x + 13y + 8z = 121$$

$$x - 3y + 4z = -10$$

$$3x - 3y + 7z = 9$$

The solution set is $\{(\underline{\quad}, \underline{\quad}, \underline{\quad})\}$.

Question 36 of 46

Solve the system by using Gaussian elimination or Gauss-Jordan elimination.

$$5x - 19y + 9z = -85$$

$$x - 4y + 5z = -24$$

$$x + 3y + 2z = 3$$

The solution set is $\{(\underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}})\}$.

Question 37 of 46

(a) Give the order of the matrix.

(b) Classify the matrix as a square matrix, row matrix, column matrix, or none of these.

$$\begin{bmatrix} 8 \\ 3 \\ 6 \end{bmatrix}$$

Part 1 of 2

(a) The order of the matrix is $\underline{\hspace{1cm}} \times \underline{\hspace{1cm}}$.

Part 2 of 2

(b) The matrix is $\underline{\hspace{2cm}}$.
(Blank 1,)

Blank 1, Options

- a square matrix
- a row matrix
- a column matrix
- none of these

Question 38 of 46

Find $B + D$ and simplify, if possible. Select "Undefined" if applicable.

$$B = \begin{bmatrix} -8 & 3 \\ 7.5 & 4 \\ \frac{1}{2} & \sqrt{10} \end{bmatrix} \quad D = \begin{bmatrix} 4 & 2 & 8 \\ -2 & 4 & \frac{1}{5} \end{bmatrix}$$

$$B + D = \underline{\hspace{2cm}}$$

Question 39 of 46

$$A = \begin{bmatrix} 3 & 2 & 1 \\ -4 & 0 & 5 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 2 \\ 3 & -7 \\ 6 & 4 \end{bmatrix}$$

(a) Find AB if possible.

(b) Find BA if possible.

(c) Find A^2 if possible. (*Hint: $A^2 = A \cdot A$*)

Part 1 of 3

(a) $AB =$ _____

Part 2 of 3

(b) $BA =$ _____

Part 3 of 3

(c) $A^2 =$ _____

Question 40 of 46

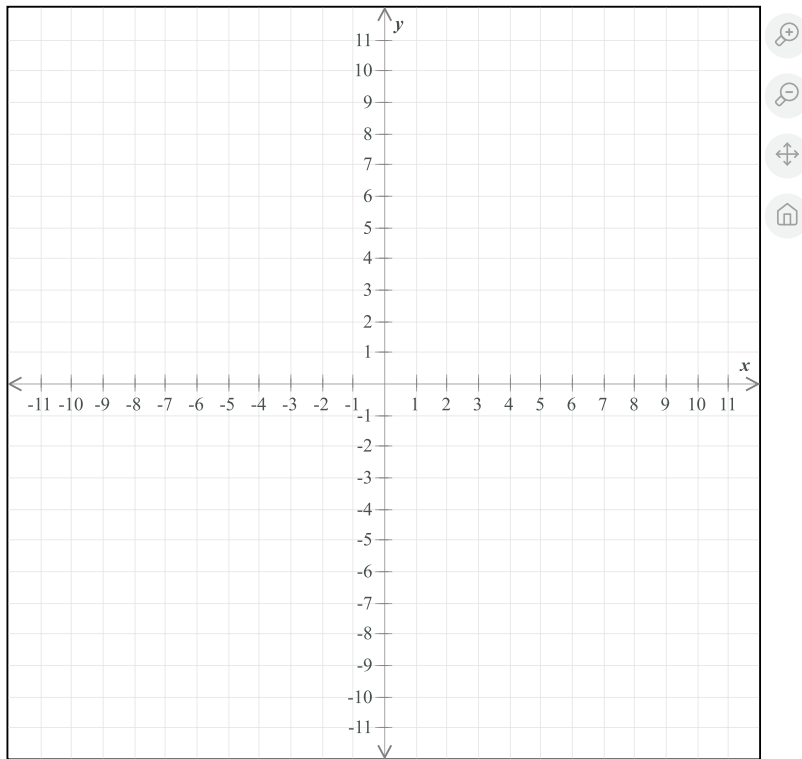
- (a) Graph the equations in the system.
- (b) Solve the system by using the substitution method.

$$y = -x^2 + 6$$

$$y - x = 0$$

Part 1 of 2

- (a) Graph the equations in the system.



Part 2 of 2

- (b) Solve the system by using the substitution method.

The solution set is _____.

Question 41 of 46

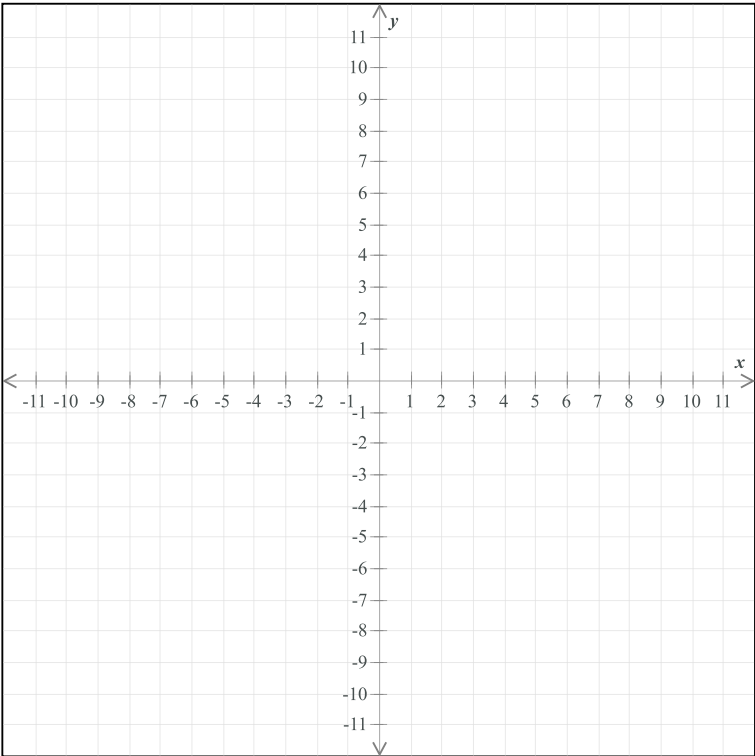
- (a) Graph the equations in the system.
- (b) Solve the system by using the substitution method.

$$x^2 + y^2 = 100$$

$$6y = 8x$$

Part 1 of 2

- (a) Graph the equations in the system.



Part 2 of 2

- (b) Solve the system by using the substitution method.

The solution set is _____.

Question 42 of 46

Determine whether A and B are inverses.

$$A = \begin{bmatrix} -1 & 9 \\ 7 & 8 \end{bmatrix} \text{ and } B = \begin{bmatrix} 3 & 4 \\ -1 & -8 \end{bmatrix}$$

Part 1 of 4

To determine whether A and B are inverses we must compute _____.

(Blank 1,)

Blank 1, Options

BA

AB

IA

AI and BI

AB and BA

IB

Part 2 of 4

$AB =$ _____

Part 3 of 4

$BA =$ _____

AB and BA _____ the identity matrix. Therefore, A and B _____ inverses.
 (Blank 1,) (Blank 2,)

Blank 1, Options

equal

do not equal

Blank 2, Options

are

are not

Question 43 of 46

Determine the inverse of the given matrix if possible. Otherwise, state that the matrix is singular.

$$A = \begin{bmatrix} -5 & -6 \\ -5 & -6 \end{bmatrix}$$

- ☐ The matrix is singular.
- ☐ The matrix is nonsingular.

$$A^{-1} = \underline{\hspace{2cm}}$$

Question 44 of 46

Determine the inverse of the given matrix if possible. Otherwise, state that the matrix is singular.

$$A = \begin{bmatrix} 3 & 7 \\ 6 & 14 \end{bmatrix}$$

- ☐ The matrix is singular.
- ☐ The matrix is nonsingular.

$$A^{-1} = \underline{\hspace{2cm}}$$

Question 45 of 46

Determine the inverse of the given matrix if possible. Otherwise, state that the matrix is singular.

$$A = \begin{bmatrix} 7 & 6 & -2 \\ -9 & -5 & 1 \\ 8 & 5 & -1 \end{bmatrix}$$

- ☐ The matrix is singular.
- ☐ The matrix is nonsingular.

$$A^{-1} = \underline{\hspace{4cm}}$$

Question 46 of 46

Write the system of equations of a matrix equation of the form $AX=B$, where A is the coefficient matrix, X is the column matrix of variables, and B is the column matrix of constants.

$$-8x \quad + 2z = 3$$

$$7y - 4z = -29$$

$$-2x + 2y + 3z = -14$$

Part 1 of 3

$A =$ _____

Part 2 of 3

$X =$ _____

Part 3 of 3

$B =$ _____