

Instructor _____

EKU ID: _____

Calculators are NOT allowed on this part of the final. Show work to support each answer. Full credit may not be awarded for questions without any work shown. Each question in this section is worth 10 points. Calculators are NOT allowed on this part of the final. Show work to support each answer. Full credit may not be awarded for questions without any work shown. Each question in this section is worth 10 points.

1) Solve the system of equations .

$$4x + 7y = -14$$

$$2x - 3y = 6$$

2) $5^{2t-1} = 25$

3) Find the inverse of $f(x) = 6x^3 - 1$.

4) a) The tables below give the number of points scored and rebounds gotten by the five starters on a basketball team in the first two games of the season. Write a matrix containing the total number of points and rebounds for each of the starting five.

Game 1	Points	Rebounds
Levy	23	3
Cowens	16	5
Williams	8	12
Miller	2	11
Jenkins	10	2

Game 2	Points	Rebounds
Levy	18	4
Cowens	13	3
Williams	12	9
Miller	4	10
Jenkins	10	3

b) Let $A = \begin{bmatrix} 0 & -3 & 1 \\ 5 & -1 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & 1 \\ 1 & -1 \end{bmatrix}$. Find AB .

MULTIPLE CHOICE. Choose the best answer. Circle the correct letter on the answer sheet, and then fill in your circle. Each question in this section is worth 5 points. Calculators are allowed on this section of the exam.

Fill in each blank with the appropriate response.

- 1) The graph of $y = -\frac{1}{6}(x + 3)^2 - 8$ can be obtained from the graph of $y = x^2$ by shifting horizontally _____ units to the _____, vertically compressing by a factor of _____, reflecting across the _____-axis, and shifting vertically _____ units in the _____ direction.

A) 3; right; $\frac{1}{6}$; x; 8; upward

B) 3; right; $\frac{1}{6}$; x; 8; downward

C) 3; left; 8; x; $\frac{1}{6}$; downward

D) 3; left; $\frac{1}{6}$; x; 8; downward

Given functions f and g , find $(f - g)(x)$.

2) $f(x) = 3x - 4$, $g(x) = 9x - 6$

F) $-6x + 2$

G) $12x - 10$

H) $-6x - 10$

J) $6x - 2$

Find the requested function value.

3) Find $(g \circ f)(10)$ when $f(x) = \frac{x-1}{3}$ and $g(x) = 2x + 3$.

A) 15

B) $\frac{22}{3}$

C) 69

D) 9

Solve the problem.

- 4) A size 8 dress in Country C is size 48 in Country D. A function that converts dress sizes in Country C to those in Country D is $f(x) = 2(x + 16)$. Find a formula for the inverse of this function.

F) $f^{-1}(x) = \frac{x-16}{2}$

G) $f^{-1}(x) = \frac{x}{2} - 16$

H) $f^{-1}(x) = \frac{x}{2} + 16$

J) $f^{-1}(x) = x - 16$

- 5) The population of a small country increases according to the function $B = 2,500,000e^{0.02t}$, where t is measured in years. How many people will the country have after 3 years?

A) 2,654,591

B) 7,033,527

C) 2,870,384

D) 3,054,622

Write in logarithmic form.

6) $9^{7x} = y$

F) $\log_y 9 = 7x$

G) $\log_y 7x = 9$

H) $\log_9 7x = y$

J) $\log_9 y = 7x$

Solve the problem.

- 7) The sales of a new product (in items per month) can be approximated by $S(x) = 325 + 200 \log(3t + 1)$, where t represents the number of months after the item first becomes available. Find the number of items sold per month 3 months after the item first becomes available.

A) 525 items per month
B) 2325 items per month
C) 725 items per month
D) 4325 items per month

Rewrite the expression as the sum and/or difference of logarithms, without using exponents. Simplify if possible.

8) $\log_2 \frac{x^8 y^7}{5}$

F) $8 \log_2 x + 7 \log_2 y - \log_2 5$
G) $(8 \log_2 x)(7 \log_2 y) - \log_2 5$
H) $8 \log_2 x + 7 \log_2 y + \log_2 5$
J) $8 \log_2 x - 7 \log_2 y - \log_2 5$

Solve the equation. Round to three decimal places.

9) $4^{(x-1)} = 15$

A) 0.953
B) 4.750
C) 2.322
D) 2.953

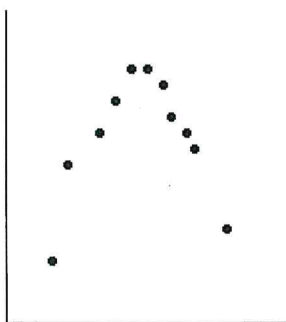
Solve the logarithmic equation. Be sure to reject any value that is not in the domain of the original logarithmic expressions. Give the exact answer.

10) $\log_3 (x + 1) = 2$

F) {7}
G) {9}
H) {10}
J) {8}

Determine whether a linear, quadratic, exponential, or a logarithmic function would be more appropriate model for the graphed data.

11)



A) Linear
B) Quadratic
C) Exponential
D) Logarithmic

Solve the problem.

- 12) Find an exponential function to model the data below and use it to predict about how many widgets will be produced in 2019. Round to the nearest million widgets.

Years after 2010	Number of Widgets Produced (in millions)
1	1.9
2	3.0
3	4.6
4	6.3
5	8.6

- F) 60 million widgets
H) 11 million widgets
- G) 20 million widgets
J) 41 million widgets
- 13) What will be the amount in an account with initial principal \$7000 if interest is compounded continuously at an annual rate of 7.25% for 5 years?
A) \$10,058.42 B) \$7000.00 C) \$2909.24 D) \$7526.35
- 14) Barbara knows that she will need to buy a new car in 2 years. The car will cost \$15,000 by then. How much should she invest now at 8%, compounded quarterly, so that she will have enough to buy a new car?
F) \$11,907.48 G) \$12,802.36 H) \$13,868.34 J) \$13,888.89
- 15) In order to purchase a home, a family borrows \$40,000 at an annual interest rate of 12%, to be paid back over a 25 year period in equal monthly payments. What is their monthly payment?
A) \$421.29 B) \$16.00 C) \$436.26 D) \$400.00

Write the augmented matrix associated with the system.

$$16) \begin{cases} 3x + 3z = 33 \\ 9y + 4z = 37 \\ -2x + 7y + 9z = 62 \end{cases}$$

F)

$$\left[\begin{array}{ccc|c} 3 & 0 & -2 & 33 \\ 0 & 9 & 7 & 37 \\ 3 & 4 & 9 & 62 \end{array} \right]$$

G)

$$\left[\begin{array}{ccc|c} 3 & 3 & 0 & 33 \\ 9 & 4 & 0 & 37 \\ -2 & 7 & 9 & 62 \end{array} \right]$$

H)

$$\left[\begin{array}{ccc|c} 3 & 0 & 3 & 33 \\ 0 & 9 & 4 & 37 \\ -2 & 7 & 9 & 62 \end{array} \right]$$

J)

$$\left[\begin{array}{ccc|c} 3 & 0 & 3 & 33 \\ 0 & 9 & 4 & 37 \\ -2 & 7 & 9 & 62 \end{array} \right]$$

Find the solution or solutions, if any exist, to the system.

$$17) \begin{cases} x + y + z = 11 \\ x - y + 5z = 23 \\ 5x + y + z = 31 \end{cases}$$

A) $x = 5, y = 2, z = 4$

C) inconsistent system, no solution

B) $x = 4, y = 5, z = 2$

D) $x = 4, y = 2, z = 5$

Find the indicated matrix.

18) Let $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 \\ -1 & 6 \end{bmatrix}$. Find $3A + B$.

F) $\begin{bmatrix} 3 & 13 \\ 5 & 18 \end{bmatrix}$

G) $\begin{bmatrix} 3 & 21 \\ 3 & 30 \end{bmatrix}$

H) $\begin{bmatrix} 3 & 7 \\ 5 & 10 \end{bmatrix}$

J) $\begin{bmatrix} 3 & 13 \\ 1 & 10 \end{bmatrix}$

Write out the first five terms of the sequence.

19) $a_n = 4n - 2$

A) -2, -6, -10, -14, -18

B) 6, 10, 14, 18, 22

C) 2, 6, 10, 14, 18

D) 2, 3, 4, 5, 6

Evaluate the sum. Round to two decimal places, if necessary.

20) $\sum_{k=2}^5 (3k - 2)$

F) 30

G) 34

H) 19

J) 26

Solve the problem.

21) Find the 25th term of the arithmetic sequence with first term -3 and common difference -4.

A) -103

B) 97

C) 93

D) -99

22) Find the sum of the first 10 terms of the arithmetic sequence 88, 159, 230, ...

F) -2315

G) 3635

H) -3635

J) 4075