

MAT 101: Exam 3
Winter – 2021
01/21/2021
80 Minutes

Name: _____

Write your name on the appropriate line on the exam cover sheet. This exam contains 17 pages (including this cover page) and 16 questions. Check that you have every page of the exam. Answer the questions in the spaces provided on the question sheets. Be sure to answer every part of each question and show all your work.

Question	Points	Score
1	6	
2	6	
3	6	
4	7	
5	6	
6	6	
7	6	
8	7	
9	6	
10	6	
11	6	
12	7	
13	6	
14	6	
15	6	
16	7	
Total:	100	

1. (6 points) Determine if the following system of equations has a solution. Be sure to fully justify your answer.

$$\begin{cases} y = 2x - 5 \\ 6x - 3y = -12 \end{cases}$$

2. (6 points) Being sure to fully justify your answer, determine if $(-5, 4)$ is a solution to the following system of equations:

$$\begin{aligned}2x + 5y &= 10 \\ -3x - 6y &= -9\end{aligned}$$

3. (6 points) Showing all your work, solve the following system of equations:

$$\begin{cases} x - 2y = 12 \\ 3x + y = 15 \end{cases}$$

4. (7 points) Showing all your work, solve the following system of equations:

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

$$3x - 4y = -5$$

5. (6 points) Compute the following, being sure to simplify as much as possible:

$$\frac{2x - 1}{x + 2} - \frac{x - 4}{x - 3}$$

6. (6 points) Compute the following, being sure to simplify as much as possible:

$$\frac{x^2 - 1}{x^2 - x - 6} + \frac{x + 1}{x^2 - 9}$$

7. (6 points) Compute the following, being sure to simplify as much as possible:

$$\frac{x^2 + 14x + 24}{x^2 - 5x} \cdot \frac{x^2 + x}{x^2 - 4x - 12}$$

8. (7 points) Compute the following, being sure to simplify as much as possible:

$$\frac{\frac{x^2 - 16}{x^2 + 10x + 25}}{\frac{x^2 + 11x + 28}{x^2 + 2x - 15}}$$

9. (6 points) Write the function $y = -4(3^{1-2x})$ in the form $y = Ab^x$ and determine whether y is an increasing or decreasing function. Be sure to fully justify your answer.

10. (6 points) Solve the following equation without the use of logarithms:

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

11. (6 points) Solve the following equation:

$$6(9^x) + 10 = 12$$

12. (7 points) Solve the following equation:

$$3e^{2x} - 5 = 22$$

13. (6 points) Evaluate the following:

(a) $\log_6(1)$

(b) $\log_{17}(17)$

(c) $\ln(1)$

(d) $\log_8(64)$

(e) $\log_2(\frac{1}{16})$

(f) $\log_9(\frac{1}{3})$

14. (6 points) Write the following expression using a single logarithm and no negative powers:

$$2 \ln(x) - 3 \ln(y^2) + \frac{1}{4} \ln(z^{-1})$$

15. (6 points) Showing all your work, solve the following:

$$\log_5(2x - 3) + 6 = 8$$

16. (7 points) Showing all your work, solve the following:

$$10 - 2 \ln x = 5$$