

Math 107 Exam #2

November 30, 2022

Time: 1 hour and 20 minutes
Instructions: Show all work for full credit.
No outside materials or calculators allowed.
Extra Space: Use the backs of each sheet for extra space. Clearly label when doing so.

Name: _____

ID #: _____

Instructor/Section: _____

"I pledge by my honor that I have abided by the NJIT Academic Integrity Code."

_____ (Signature)

Problem(s) Score Total

Problem(s)	Score	Total

Relevant formulas for this exam:

Distance formula

$$d(p, q) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Pythagorean Theorem

$$a^2 + b^2 = c^2$$

Compound Interest

$$A = P \left(1 + \frac{r}{n} \right)^{nt}$$

1. Evaluate. If the answer does not exist please put "Undefined" (12 points):

a. $\log_3 243 = \underline{\hspace{2cm}}$

b. $\log_3 \frac{1}{81} = \underline{\hspace{2cm}}$

c. $\ln 1 = \underline{\hspace{2cm}}$

d. $\log_6 -216 = \underline{\hspace{2cm}}$

2. Solve each system of equations. Write your answer as an ordered pair. (8 points)

a.
$$\begin{aligned} x - 2y &= 3 \\ 4x + 6y &= 3 \end{aligned}$$

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

2a) _____

2b) _____

3. Let $\log_a 4 = 1.5$ and $\log_a 7 = 1.2$. Evaluate each of the following: **(6 points)**

a) $\log_a 16$

3a) _____

b) $\log_a 28$

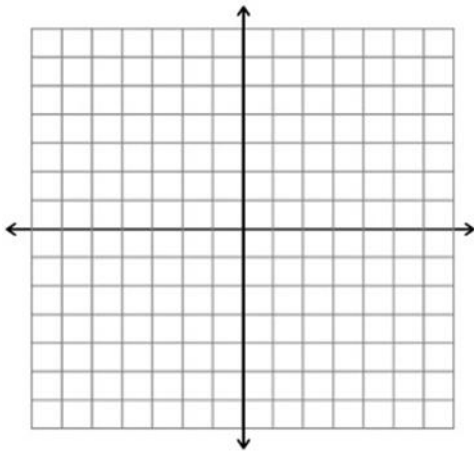
3b) _____

c) $\log_a \frac{28}{49}$

3c) _____

4. Graph the function. Give the vertex on the line below. **(9 points)**

a) $f(x) = -2x^2 + 8x - 5$



4. _____

5. Solve the equation: **(7 points)**

a. $3(x^2 + 1) = 2x^2 + 4x + 1$

a. _____

6. Solve the logarithmic equations. **(10 points)**

6a) $\ln x + \ln(x + 1) = \ln(x - 1) + \ln 6$

a. _____

6b) $\log_{14}(-x^2 + 5x) = \log_{14}(24 - 2x^2)$

b. _____

7. The sum of the number of calories in a hamburger from Boston Burger and a hamburger from Carmen's Broiler is 1130. The difference in the number of calories in the hamburgers is 40. If the Boston Burger has the larger number of calories, how many calories are in each restaurant's burger? **(7 points)**

7. _____

8. **(12 points)**

a. Divide the polynomial $2x^3 - 7x^2 + 5$ by $x - 3$

a. _____

b. State whether the binomial is a factor of the given polynomial:

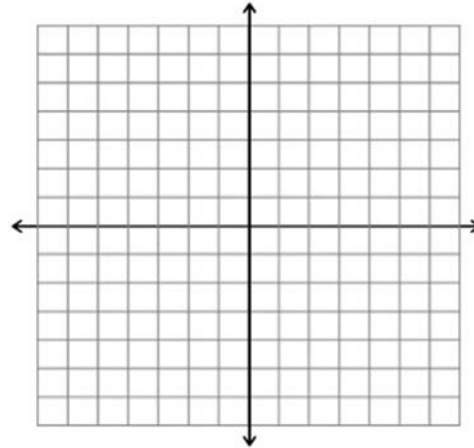
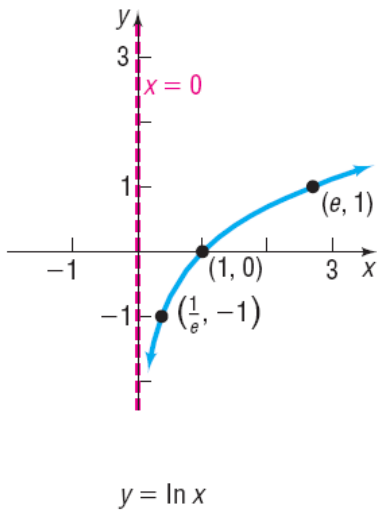
$$(2x^3 + 3x^2 - 6x + 1) \div (x - 1)$$

b. _____

9. Given the graph $y = \ln x$ below, use transformations to sketch the graph of:

$$y = \ln(x-3) - 2$$

Be sure to identify the asymptote and the y - intercept. **(10 points)**



10. Describe the end behavior of the function. **(4 points)**

$$x^5 + 2x^3 - x + 1$$

10. _____

11. Solve. (9 points)

a) $216^{2n} = 36$

a. _____

b) $5^{3x} \times 5^{-3x} = 5^{-3x}$

b. _____

c) $27^{3a} = \frac{1}{3}$

c. _____

12. Expand or contract the logarithmic expression(s): **(6 points)**

a. $\log_8 \left(\frac{a}{cb^2} \right)^4$

a. _____

b. $2\log_8 3 + 12\log_8 11 + 2\log_8 5$

b. _____