

NAME

Mth 163 Test – Unit III
Section 4.6

1. Determine the domain of the function.

$$f(x) = \frac{7x}{x(x-9)}$$

- [A] All real numbers $x \neq 9, x \neq 0$
[B] All real numbers $x \neq \pm 9, x \neq 0$
[C] All real numbers $x \neq \pm 3$
[D] All real numbers $x \neq 3$

2. Find the domain of the function.

$$f(x) = \frac{x^2 + 3x - 54}{x^2 + 4x + 3}$$

3. Find the horizontal asymptote of the graph of $f(x) = \frac{9}{x-8}$.

- [A] $y = 0$
[B] $x = 8$
[C] $y = 9$
[D] $x = 0$

4. Identify any horizontal and vertical asymptotes for the graph of the function.

$$f(x) = \frac{3x+5}{7x+5} \quad [\text{SHOW YOUR WORK.}]$$

5. Find the vertical asymptote(s), if any, for $f(x) = \frac{5x-4}{x^2-9x+18}$.

- [A] $x = 6, x = 3, x = -4$ [B] $x = -4, x = 6$
[C] $x = 6, x = 3$ [D] No vertical asymptotes

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6. The learning curve for a certain task is given by the equation

$$P = \frac{0.5 + 0.5(n-1)}{1 + 0.9(n-1)}, \quad n > 0$$

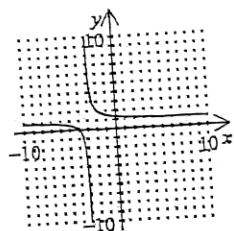
where P is the fraction of correct responses after n trials. Find the value of P after 90 trials.
[SHOW YOUR WORK.]

- [A] 0.57
[B] 0.56
[C] 0.55
[D] 0.52

7. Identify the graph of the rational function. Find any vertical and horizontal asymptotes.

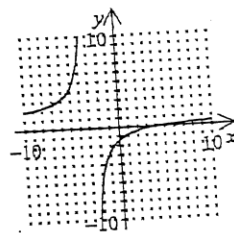
$$f(x) = \frac{x+4}{x+3}$$

[A]



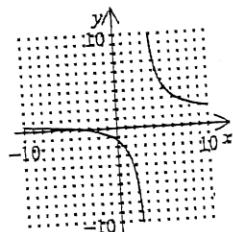
Asymptotes: $y = 1, x = -3$

[B]



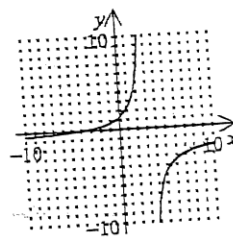
Asymptotes: $y = 1, x = -3$

[C]



Asymptotes: $y = 1, x = 3$

[D]

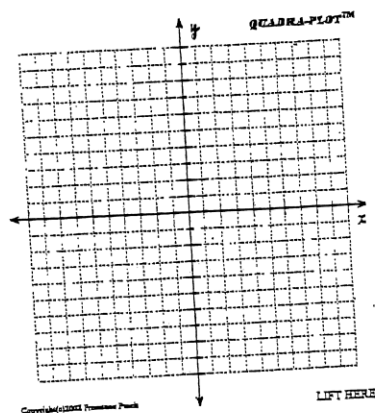


Asymptotes: $y = -1, x = 3$

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8. Sketch the graph of the rational function. Find any intercepts and vertical and horizontal asymptotes.

$$f(x) = \frac{3}{x^2 - 16}$$



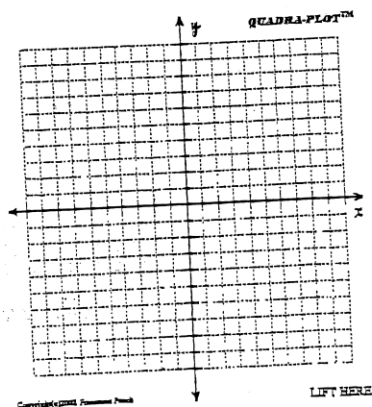
9. Find the equation of the slant asymptote of the graph of the rational function

$$f(x) = \frac{2x^2 - 8x + 3}{x - 2}$$

[SHOW YOUR WORK]

10. Graph the rational function and find the equation of the slant asymptote.

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



Mth 163 Test – Unit IV
Sections: 5.2-5.4

NAME _____

1. Evaluate the expression.

$$2^{-2\pi}$$

[A] 0.013

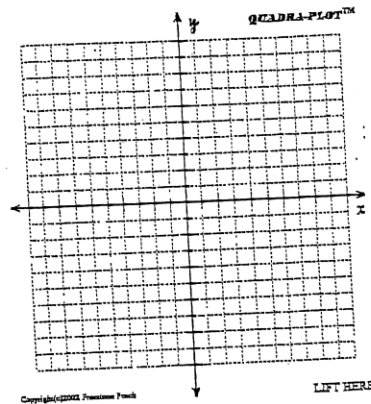
[B] -4.283

[C] -12.566

[D] 77.88

2. Sketch the graph of the function.

$$f(x) = \left(\frac{8}{5}\right)^x$$



3. Evaluate the expression.

$$e^{-3}$$

[A] 1.284

[B] 0.050

[C] -8.155

[D] 20.086

4. Evaluate the expression without using a calculator.

$$\log_{10} \sqrt[3]{10}$$

5. Write the exponential equation in logarithmic form.

$$3^8 = 6561$$

6. Identify the logarithmic equation written in exponential form.

$$\log_{1024} 16 = \frac{2}{5}$$

[A] $1024^{2/5} = 16$

[B] $\left(\frac{2}{5}\right)^{16} = 1024$

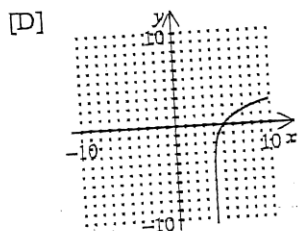
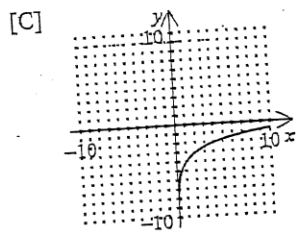
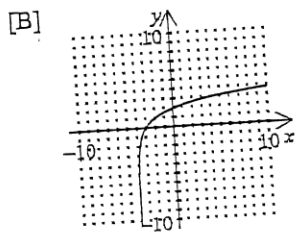
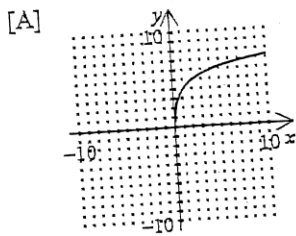
[C] $\left(\frac{2}{5}\right)^{1024} = 16$

[D] $16^{2/5} = 1024$

Mth 163 Test – Unit IV
Sections: 5.2-5.4

Identify the graph of the logarithmic function.

7. $f(x) = \log_2(x-4)$

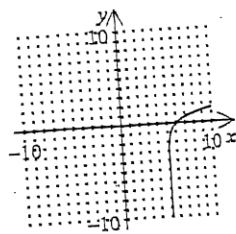


Mth 163 Test – Unit IV
Sections: 5.2-5.4

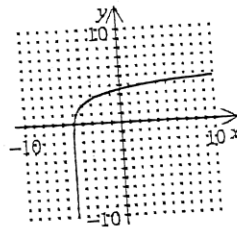
Identify the graph of the logarithmic function.

8. $f(x) = 2 + \ln(x-5)$

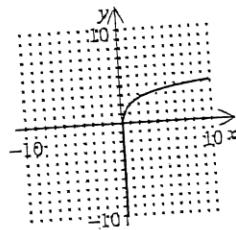
[A]



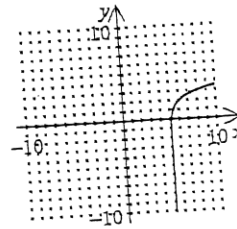
[B]



[C]



[D]



9. Use a calculator to evaluate the logarithm. Round to three decimal places.

$$\ln(2 + \sqrt{2})$$

10. Which is the logarithm rewritten as a ratio of natural logarithms?

$$\log_x \frac{3}{2}$$

[A] $\ln x - \ln \frac{3}{2}$

[B] $\frac{\ln x}{\ln \frac{3}{2}}$

[C] $\ln \left(\frac{3}{2} \cdot x \right)$

[D] $\frac{\ln \frac{3}{2}}{\ln x}$

Mth 163 Test – Unit IV
Sections: 5.2-5.4

Find the value of the expression without using a calculator.

11. $4 \ln e^3$

[A] $\frac{3}{4}$ [B] $\frac{4}{3}$ [C] $12e$ [D] 12

Find the value of the expression without using a calculator. [SHOW YOUR WORK.]

12. $\log_3 3 + \log_3 27 - \log_3 81$

13. Condense the expression to the logarithm of a single quantity.
 $3 \log_{10} x + 2 \log_{10} (x+8)$ [SHOW YOUR WORK.]

[A] $\log_{10} x(x+8)$ [B] $\log_{10} x^3(x+8)^2$
[C] $\log_{10} x(x+8)^6$ [D] None of these

14. Use the properties of logarithms to expand the expression. (Assume all variables are positive.)

$$\log_x \frac{6xy^5}{z^4}$$

Solve for x . [SHOW YOUR WORK.]

15. $\frac{1}{4} = 8^{9x+4}$

Mth 163 Test – Unit IV
Sections: 5.2-5.4

Solve for x . [SHOW YOUR WORK.]

16. $e^x = 3$

17. Solve the exponential equation algebraically. Approximate the result(s) to three decimal places. [SHOW YOUR WORK.]

$$26 = 2e^{0.045t}$$

18. Find the value of x . [SHOW YOUR WORK.]

$$\log_3 x + \log_3 (x - 80) = 4$$

19. Find the value of x . Round to three decimal places. [SHOW YOUR WORK.]

$$\ln \sqrt{8x - 5} = 2.6$$

20. The number of bacteria present in a culture is

$$B = 100e^{0.5t}$$

where t is the time in minutes. Find the time required, to the nearest half minute, to have 9000 bacteria present. [SHOW YOUR WORK.]

[A] 8.5 min

[B] 9.0 min

[C] 9.5 min

[D] 8.0 min

NAME

Mth 163 Test – Unit V
Sections: 6.5, 7.1-7.4

1. Find the minimum and maximum values of the objective function and where they occur, subject to the indicated constraints.

Objective function:

$$z = 4x + 7y$$

Constraints:

$$x + y \geq 2$$

$$8x - 2y \leq 16$$

$$-6x + 4y \leq 8$$

[A] Minimum at (0, 2): 8
Maximum at (4, 5): 51

[C] Minimum at (2, 0): 8
Maximum at (4, 8): 72

[B] Minimum at (2, 0): 8
Maximum at (4, 5): 51

[D] Minimum at (0, 2): 8
Maximum at (8, 4): 72

2. Determine the order of the matrix.

$$\begin{bmatrix} 2 & 8 & -1.5 & 1.4 & -0.5 \\ -5 & -1 & 9 & -7 & 2 \\ 0.5 & -0.13 & 1.33 & 9 & 1.4 \\ 6 & -0.63 & -6 & 5 & -8 \\ -\frac{2}{4} & 2.67 & 0 & -3 & 0.66 \end{bmatrix}$$

[A] 7×7

[B] 6×5

[C] 5×5

[D] 6×6

3. Find x and y .

$$\begin{bmatrix} 2 & -4 \\ -8 & x \end{bmatrix} = \begin{bmatrix} 2 & y \\ -8 & 4 \end{bmatrix}$$

Mth 163 Test – Unit V
Sections: 6.5, 7.1-7.4

Evaluate the expression.

4. $-9A - 3B$

$$A = \begin{bmatrix} -3 & -6 & -5 \\ 1 & -4 & 6 \\ 5 & -8 & 7 \end{bmatrix}, \quad B = \begin{bmatrix} -9 & -4 & -8 \\ -2 & 3 & -1 \\ -6 & -5 & -3 \end{bmatrix}$$

$$[A] \begin{bmatrix} 54 & 66 & 69 \\ -3 & 27 & -51 \\ -27 & 87 & -54 \end{bmatrix}$$

$$[B] \begin{bmatrix} -72 & -18 & -57 \\ -21 & 39 & -27 \\ -69 & -21 & -48 \end{bmatrix}$$

$$[C] \begin{bmatrix} 0 & 42 & 21 \\ -15 & 45 & -57 \\ -63 & 57 & -72 \end{bmatrix}$$

$$[D] \begin{bmatrix} 90 & 54 & 87 \\ 15 & -15 & -9 \\ 39 & 69 & 6 \end{bmatrix}$$

5. $A + B$

$$A = \begin{bmatrix} -4 & -2 & 5 \\ -8 & 7 & 8 \\ 9 & -1 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} -7 & -6 & -8 \\ -3 & 3 & 2 \\ 5 & -1 & -2 \end{bmatrix}$$

6. Find the product, if possible.

$$AB, \text{ if } A = \begin{bmatrix} 0 & 3 & 1 \\ 3 & -1 & 0 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & -1 \\ 0 & 1 \\ -4 & -1 \end{bmatrix}$$

$$[A] \begin{bmatrix} 0 & -3 \\ 0 & -1 \\ 0 & 0 \end{bmatrix}$$

$$[B] \begin{bmatrix} -4 & 3 \\ 2 & -4 \end{bmatrix}$$

$$[C] \begin{bmatrix} -3 & 4 & 1 \\ 3 & -1 & 0 \\ -3 & -11 & 0 \end{bmatrix}$$

$$[D] \begin{bmatrix} -4 & 2 \\ 3 & -4 \end{bmatrix}$$

Mth 163 Test – Unit V
Sections: 6.5, 7.1-7.4

7. Determine whether or not matrix B is the inverse of matrix A .

$$A = \begin{bmatrix} 7 & 10 & -37 \\ 1 & 2 & -8 \\ 2 & 4 & -15 \end{bmatrix}, \quad B = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} & -\frac{3}{2} \\ -\frac{1}{4} & -\frac{31}{4} & \frac{19}{4} \\ 0 & -2 & 1 \end{bmatrix}$$

$$[A] \quad AB = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \text{ and } BA = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad B \text{ is not the inverse of } A.$$

$$[B] \quad AB = \begin{bmatrix} 64 & -255 & -57 \\ \frac{27}{2} & -\frac{215}{4} & -12 \\ \frac{31}{2} & -\frac{411}{4} & -23 \end{bmatrix} \quad B \text{ is the inverse of } A.$$

$$[C] \quad AB = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \text{ and } BA = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad B \text{ is the inverse of } A.$$

$$[D] \quad AB = \begin{bmatrix} 64 & -255 & -57 \\ \frac{27}{2} & -\frac{215}{4} & -12 \\ \frac{31}{2} & -\frac{411}{4} & -23 \end{bmatrix} \quad B \text{ is not the inverse of } A.$$

8. Find the inverse of the matrix (if it exists).

$$\begin{bmatrix} -2 & 2 & -4 \\ 0 & 5 & -5 \\ 3 & -3 & -1 \end{bmatrix}$$

9. If possible, solve the system of equations using an inverse matrix. [SHOW YOUR WORK.]

$$\begin{cases} x + 2y + z = -3 \\ 3x + 7y - 2z = 25 \\ x - y - 6z = 27 \end{cases}$$

Mth 163 Test – Unit V
Sections: 6.5, 7.1-7.4

Find the determinant of the matrix.

10. $\begin{bmatrix} -4 & -3 \\ 10 & 4 \end{bmatrix}$

Find the determinant of the matrix.

11. $\begin{bmatrix} -1 & -3 & 4 \\ -4 & 5 & -3 \\ -2 & -2 & -5 \end{bmatrix}$

Use Cramer's Rule to solve (if possible) the system of equations. [SHOW YOUR WORK.]

12. $\begin{cases} x - 4y = 19 \\ 9x - 2y = 35 \end{cases}$

Use any method you have learned to solve, if possible, the system of equations.
[SHOW YOUR WORK]

13. $\begin{cases} 2x - 3y - z = 15 \\ 2x + 3y + z = 1 \\ 2x + 3y - z = 3 \end{cases}$