NAME

Mth 163 Test – Unit III
Section 4.6

1. Determine the domain of the function.

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

[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.

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

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

[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.

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

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

[A] $x=6,\ x=3,\ x=-4$

[B] $x=-4,\ x=6$

[C] $x=6,\ x=3$

[D] No vertical asymptotes

Mth 163 Test – Unit III
Section 4.6

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

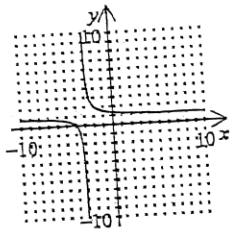
[C] 0.55

[D] 0.52

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

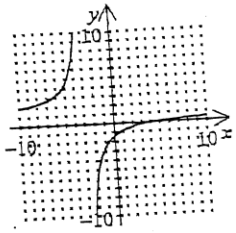
$$f(x)=\frac{x+4}{x+3}$$

[A]



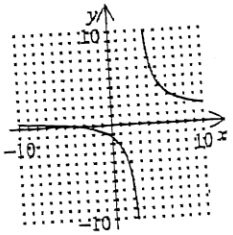
Asymptotes: $y=1, x=-3$

[B]



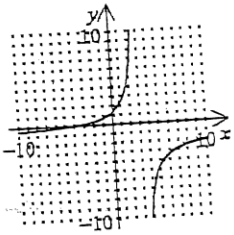
Asymptotes: $y=1, x=-3$

[C]



Asymptotes: $y=1, x=3$

[D]

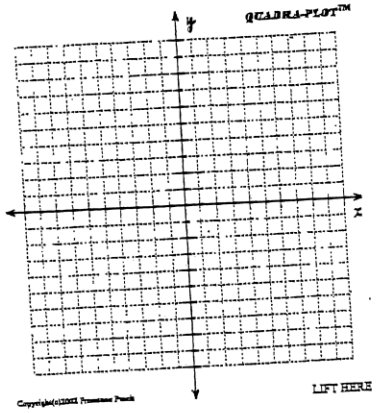


Asymptotes: $y=-1, x=3$

Mth 163 Test – Unit III
Section 4.6

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

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



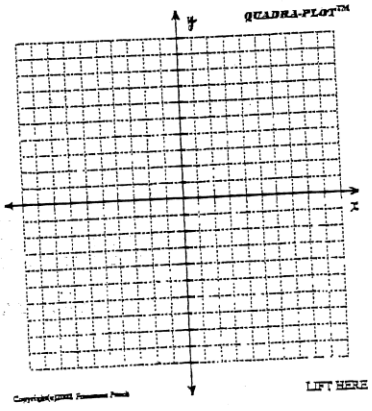
9. Find the equation of the slant asymptote of the graph of the rational function

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

[SHOW YOUR WORK]

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

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



NAME

Mth 163 Test – Unit IV
Sections: 5.2-5.4

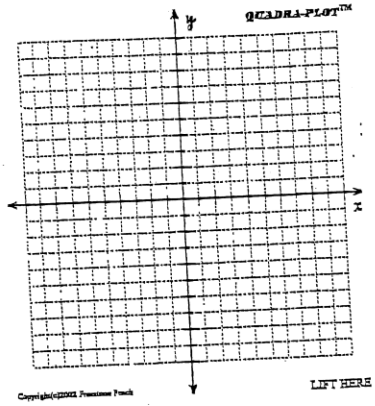
1. Evaluate the expression.

$2^{-2\pi}$

[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.

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

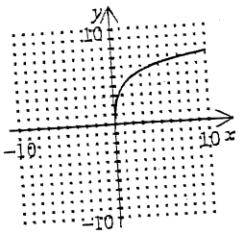
[A] $1024^{2/5}=16$ [B] $\left(\frac{2}{5}\right)^{16}=1024$ [C] $\left(\frac{2}{5}\right)^{1024}=16$ [D] $16^{2/5}=1024$

Mth 163 Test – Unit IV
Sections: 5.2-5.4

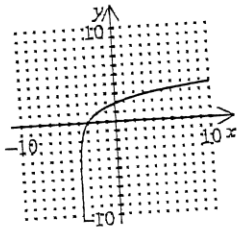
Identify the graph of the logarithmic function.

7. $f(x) = \log_1(x-4)$

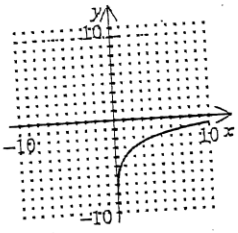
[A]



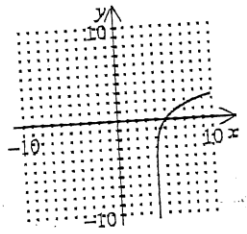
[B]



[C]



[D]

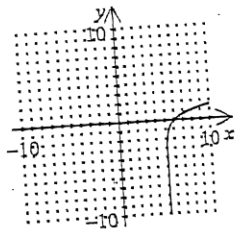


Mth 163 Test – Unit IV
Sections: 5.2-5.4

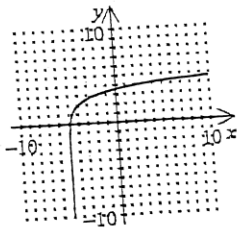
Identify the graph of the logarithmic function.

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

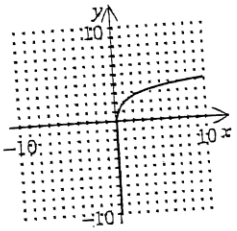
[A]



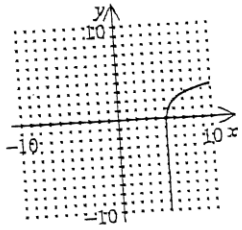
[B]



[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] $\ln\left(\frac{\frac{3}{2}}{x}\right)$ [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.)
$\log_a \frac{6xy^5}{z^4}$

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

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

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

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

2. Determine the order of the matrix.

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

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

[B] $AB=\begin{bmatrix}64 & -255 & -57\\ \frac{27}{2} & -\frac{215}{4} & -12\\ \frac{51}{2} & -\frac{411}{4} & -23\end{bmatrix}$ B is the inverse of A.

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

[D] $AB=\begin{bmatrix}64 & -255 & -57\\ \frac{27}{2} & -\frac{215}{4} & -12\\ \frac{51}{2} & -\frac{411}{4} & -23\end{bmatrix}$ B 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. $\begin{cases} 2x-3y-z=15 \\ 2x+3y+z=1 \\ 2x+3y-z=3 \end{cases}$