

Name: _____

Multiple choice problems are worth four points each; workout problems worth six points each. **You must show your work on the work-out problems.**

1. What is the range of $f(x) = 3^x$?

A. $(-\infty, \infty)$

B. $(3, \infty)$

C. $(0, \infty)$

D. $[3, \infty)$

2. Given that $g(x) = e^{x-2} + 1$ find the following accurately to three decimal places:

(a) $g(2.45) =$

(b) $g(-0.12) =$

3. $\log_a \left(\frac{M}{N} \right) =$

A. $\log_a M + \log_a N$

B. $\log_a(M - N)$

C. $M \log_a N$

D. $\log_a M - \log_a N$

4. Given that the graph of $y = a^x$ contains the point $\left(-1, \frac{1}{3}\right)$, find a .

5. Written in logarithmic form, $3^4 = 81$ is
- A. $4 = \log_3 81$
 - B. $3 = \log_4 81$
 - C. $81 = \log_3 4$
 - D. $4 = \log_{81} 3$
6. Using the equivalence between exponential and logarithmic equations, re-write each of the following in an equivalent form of opposing type:

(a) $\log_7 r = s$

(b) $4^{x+1} = t$

7. What is the domain of $y = \log_5(x - 3)$
- A. $(-3, \infty)$
 - B. $(3, \infty)$
 - C. $(-\infty, \infty)$
 - D. $(0, \infty)$
8. Find $\log_3(11.27)$ accurately to four decimal places.

9. $3^{\log_3 5} =$

- A. 9^5
- B. 5
- C. $\log 5$
- D. $\log_9 5$

10. Write in expanded form: $\log \frac{x^2 \sqrt{y}}{z^3}$

11. In the matrix $A = \begin{bmatrix} 2 & 0 \\ 3 & 7 \end{bmatrix}$, $a_{21} =$

- A. 2
- B. 0
- C. 3
- D. 7

12. Solve to three decimal place accuracy: $4^{2x-1} = 9$.

13. The system of equations $\begin{cases} x + y = 3 \\ x + y = 0 \end{cases}$

- A. independent
- B. consistent
- C. dependent
- D. inconsistent

14. Write in condensed form: $\log 2 + 3 \log M - \frac{1}{2} \log N$

15. The size of $A = \begin{bmatrix} 1 & -1 & 2 \\ 4 & 0 & 7 \end{bmatrix}$, is

- A. 6
- B. 3×2
- C. 2×3
- D. incompatible

16. Solve $\log_3(x - 2) < 2$ and express the solution in interval notation.

17. $\begin{vmatrix} 2 & -1 \\ 3 & 5 \end{vmatrix} =$

- A. -30
- B. 13
- C. 9
- D. 7

18. Use either substitution or elimination to solve $\begin{cases} 2x + y = 1 \\ x - 2y = 3 \end{cases}$ You must show your work.

19. Given $A = \begin{bmatrix} 2 & 0 \\ 1 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$ find $2A - B$.

- A. $\begin{bmatrix} 3 & 1 \\ 2 & -4 \end{bmatrix}$
- B. $\begin{bmatrix} 3 & -1 \\ 2 & -4 \end{bmatrix}$
- C. $\begin{bmatrix} 3 & 1 \\ 1 & -3 \end{bmatrix}$
- D. $\begin{bmatrix} 3 & -1 \\ 1 & -3 \end{bmatrix}$

20. Given $A = \begin{bmatrix} 2 & 0 \\ 1 & -1 \\ 3 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & -1 \\ 0 & 2 \end{bmatrix}$, find the product AB .

Bonus (10 points): Solve for x : $\det \left(\begin{bmatrix} 1 & 2 \\ 8 & 1 \end{bmatrix} - x \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \right) = 0$.