

Mathematics 3201
Unit 7: Logarithmic Functions
Unit Assessment

Name: _____

Section 1: Selected Response (40 points)
Circle the letter of the correct answer.

1. What is the end behavior of $y = 5 \log x$?
 - (A) I to II
 - (B) I to IV
 - (C) II to I
 - (D) IV to I

2. What is the end behavior of $y = -\log x$?
 - (A) I to II
 - (B) I to IV
 - (C) II to I
 - (D) IV to I

3. What is the end behavior of $y = 3 \ln x$?
 - (A) I to II
 - (B) I to IV
 - (C) II to I
 - (D) IV to I

4. What is true of the graph of $y = 4 \log x$?
 - (A) x-intercept is (1,0); no y-intercept
 - (B) x-intercept is (4,0); no y-intercept
 - (C) no x-intercept is; y-intercept(0,1)
 - (D) no x-intercept is; y-intercept (0,4)

5. What is the domain of $y = \ln x$?
 - (A) $\{x|x > 0; x \in R\}$
 - (B) $\{x|x \geq 0; x \in R\}$
 - (C) $\{x|x < 0; x \in R\}$
 - (D) $\{x|x \leq 0; x \in R\}$

6. What is the domain of $y = -2 \ln x$?

- (A) $\{x|x > 0; x \in \mathbb{R}\}$
- (B) $\{x|x > -2; x \in \mathbb{R}\}$
- (C) $\{x|x < 0; x \in \mathbb{R}\}$
- (D) $\{x|x < -2; x \in \mathbb{R}\}$

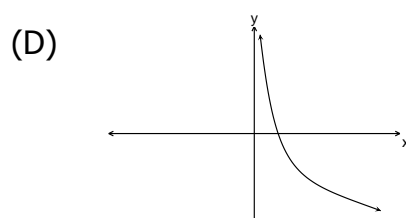
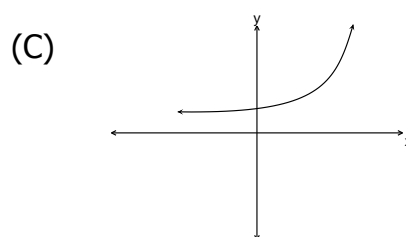
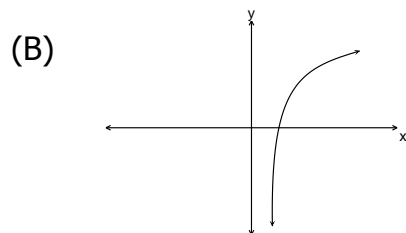
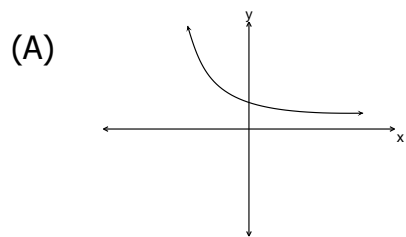
7. What is $2 \log A + \log B^3 - 5 \log C$ written as a single logarithm?

- (A) $\frac{2(\log A + \log B^3)}{5 \log C}$
- (B) $\log(A^2 + B^3 - C^5)$
- (C) $\log\left(\frac{A^2 \cdot B^3}{C^5}\right)$
- (D) $\frac{\log(A^2 \cdot B^3)}{5 \log C}$

8. Which is equivalent to $\log_4\left(\frac{AB^3}{C}\right)$?

- (A) $\log_4(A + B^3 - C)$
- (B) $\log_4 A + 3 \log_4 B - \log_4 C$
- (C) $3(\log_4 A + \log_4 B) - \log_4 C$
- (D) $3(\log_4 A + \log_4 B - \log_4 C)$

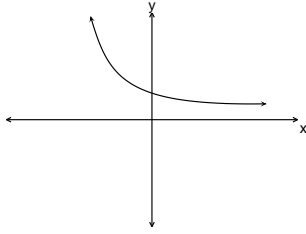
9. Which graph best represents the function $y = -\log x$?



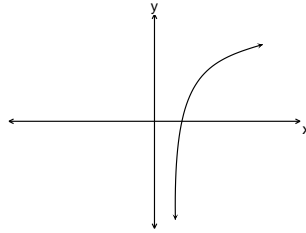
10. What is the logarithmic form of $5^x = 6$?
- (A) $\log_5 x = 6$
 - (B) $\log_5 6 = x$
 - (C) $\log_6 x = 5$
 - (D) $\log_x 5 = 6$
11. What is the exponential form of $\log_3 5 = x$?
- (A) $3^5 = x$
 - (B) $x^3 = 5$
 - (C) $5^x = 3$
 - (D) $3^x = 5$
12. Evaluate: $\log_4 10$.
- (A) 0.60
 - (B) 1.66
 - (C) 1.78
 - (D) 2.50
13. Given $5^x = 12$, which best approximates x ?
- (A) 0.65
 - (B) 1.23
 - (C) 1.46
 - (D) 1.54
14. Given $2(5)^x = 30$, what is the approximate value of x ?
- (A) 0.5
 - (B) 1.5
 - (C) 1.7
 - (D) 3.0

15. Which graph best represents the function $y = 7 \log x$?

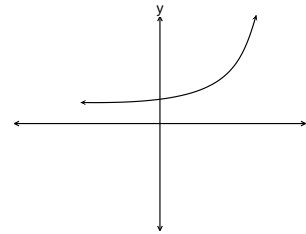
(A)



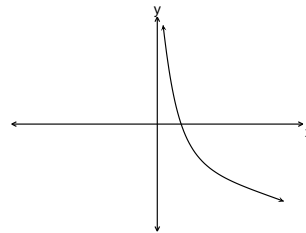
(B)



(C)



(D)



16. Evaluate $3 \log_8 24 - 3 \log_8 3$

(A) 3

(B) 7

(C) 1

(D) 64

17. The equation of the logarithmic function that models a data set is $y = 43.9 - 8.7 \ln x$. Extrapolate the value of y when $x = 120$

(A) $y = 1.2$

(B) $y = 2.2$

(C) $y = 3.2$

(D) $y = 4.2$

18. Calculate the pH of a solution with the hydrogen ion concentration of 6.5×10^{-6} mol/l. Recall that pH, $p(x)$ is defined by the equation $p(x) = -\log x$, where the concentration of hydrogen ions, in a solution measured in moles by litre.

(A) 6.5

(B) -5.2

(C) -6.5

(D) 5.2

19. What is the range of $y = -2 \log x$
- (A) $\{y|y > 0; y \in R\}$
- (B) $\{y|y \in R\}$
- (C) $\{y|y < 0; y \in R\}$
- (D) $\{y|y < -2; y \in R\}$
20. Which function will have the fastest increase in y-values
- (A) $y = \frac{1}{2} \ln x$
- (B) $y = 9 \ln x$
- (C) $y = \frac{1}{4} \ln x$
- (D) $y = 20 \ln x$

Section 2: Constructed Response

Answer all of the following questions showing all work

1. An antique auto, kept in excellent condition, was originally purchased for \$500. The value of the car was found to triple every 10 years. Write the function that describes the value of the car over time, and use it to algebraically determine how long it will take for the car to reach a value of \$35 000.
2. The half-life of a certain drug in the bloodstream is 6 days. If a patient is given 480 mg, algebraically determine how long it will take for the amount of drug in the patient's body to reduce to 15 mg.
3. \$1600 is invested at 3% per year, compounded monthly. How many years after the initial investment will it reach \$2000. Use the following formula: $A = P(1 + i)^t$
4. Explain why $\log(-4)$ does not have a solution.

5. Solve the following equations:

A) $5^{x+3} = 450$

B) $2^{3x+2} = 7^{x-3}$

6. Evaluate the following using the Laws of Logarithms:

A) $3 \log_6 2 + \log_6 27$

B) $\log_5 2.5 + 2 \log_5 10 - \log_5 2$

7. Solve for y : $e^y = 25$

8. Evaluate $\log_6 200$