Mathematics 3201 **Unit 7: Logarithmic Functions** Name:_____

Part 1: Circle the letter of the correct answer.

1. What is the end behavior of $y = \frac{1}{3}\ln x$?

   (A) I to II (B) I to IV (C) II to I (D) IV to I

2. What is the end behavior of $y = -\frac{1}{2}\log x$?

   (A) I to II (B) I to IV (C) II to I (D) IV to I

3. What is the x-intercept of $y = -2\log x$

   (A) $(1,0)$ (B) $(-2,0)$ (C) $(0,1)$ (D) $(0,2)$

4. What is the domain of $y = -\frac{1}{4}\log x$?

   (A) $\{x \mid x > 0, x \varepsilon R\}$ (B) $\{x \mid x \geq 0, x \varepsilon R\}$ (C) $\{x \mid x < 0, x \varepsilon R\}$ (D) $\{x \mid x \leq 0, x \varepsilon R\}$

5. What is $\log \mathrm{A} + 3\log \mathrm{B} - 5\log \mathrm{C}$ written as a single logarithm?

   (A) $\frac{4(\log \mathrm{A} + \log \mathrm{B})}{2\log \mathrm{C}}$ (B) $\log(\mathrm{A}^4 + \mathrm{B} - \mathrm{C}^2)$

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

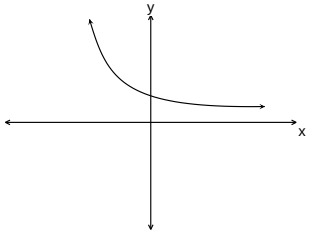
6. Which is equivalent to $\log_4\left(\frac{AB^3}{C}\right)$?

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

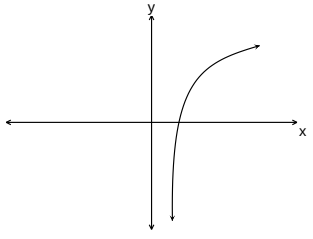
   (C) $3(\log_4 A + \log_4 B) - \log_4 C$ (D) $3(\log_4 A + \log_4 B - \log_4 C)$

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

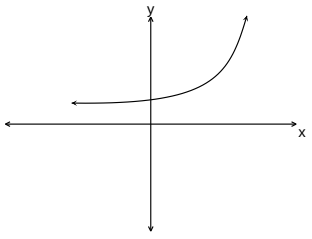
   (A)



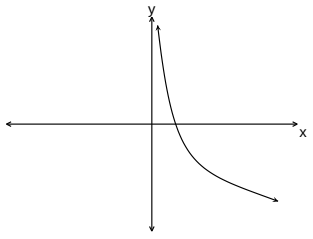
   (B)



   (C)



   (D)



8. 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) $\log_x 5 = 6$

9. What is the exponential form of $\log_3 5 = x$?

(A) $3^5 = x$ (B) $x^3 = 5$ (C) $5^x = 3$ (D) $3^x = 5$

10. Evaluate: $\log_4 10$.

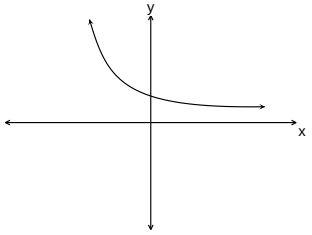
(A) 0.60 (B) 1.66 (C) 1.78 (D) 2.50

11. Given $5^x = 12$, which best approximates x?

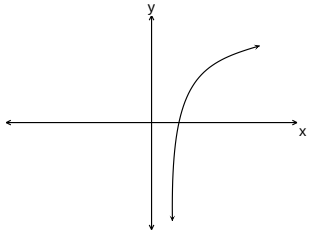
(A) 0.65 (B) 1.23 (C) 1.46 (D) 1.54

12. Which graph best represents the function $y = 7\ln x$?

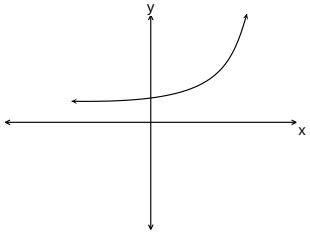
(A)



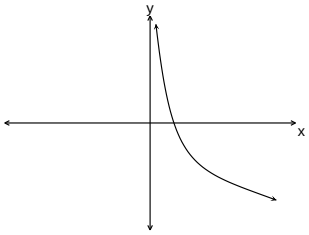
(B)



(C)



(D)



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

(A) 3 (B) 7 (C) 1 (D) 64

14. Calculate the pH of a solution with the hydrogen ion concentration of 0.0000065 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 is measured in moles per litre.

(A) 6.5 (B) -5.2 (C) -6.5 (D) 5.2

15. What is the range of y = -2 log x

(A) $\{y \mid y > 0, y \varepsilon R\}$ (B) $\{y \mid y \varepsilon R\}$ (C) $\{y \mid y < 0, y \varepsilon R\}$ (D) $\{y \mid y > -2, y \varepsilon R\}$

Part 2: Answer all of the following questions showing all work

16. Evaluate the following using the Laws of Logarithms:

(7) A) $2 \log_{12} 6 + \log_{12} 4$ B) $\frac{1}{2}\log_2 36 + \log_2 5 - \log_2 15$

17. Algebraically, solve for x :

A) $\log_4 x = -3$ B) $7^{x-2} = 310$

(6)

18. The half-life of a certain drug in the bloodstream is 4 days. If a patient is given 500mg, algebraically determine how long it will take for the amount of drug in the patient's body

(4) to reduce to 15 mg. $A = A_o\left(\frac{1}{2}\right)^{\frac{t}{h}}$

19. $2500 is invested at 7.5% per year, compounded monthly. How many years will it take for the initial investment to reach $5000. Use the following formula: $A = P(1 + i)^n$

(4)

20. In terms of hydrogen ion concentration, how much more acidic is lemon juice, with a pH of 2, than baking soda, with a pH of 9? $p(x) = -\log x$

(4)