Homework 3.4: Quiz Review

Math 3

Name: _____

Write each equation in logarithmic form.

1. $64 = 8^2$

$$\log_8 64 = 2$$

2. $8 = 2^3$

$$\log_2 8 = 3$$

3. $125 = 5^3$

$$\log_5 125 = 3$$

4. $729 = 3^6$

$$\log_3 729 = 6$$

Evaluate each logarithm.

5. $\log_3 243$

$$5$$

6. $\log_5 625$

$$4$$

7. $\log_9 729$

$$3$$

8. $\log_4 256$

$$4$$

9. Reasoning Find the value of $\log_8 64$ without using a calculator. Justify your answer.

$$\log_8 64 = 2$$

8, raised to what number, is 64?

Write each expression as a single logarithm.

10. $\log_5 3 + \log_5 6$

$\log_5 (3)(6)$

$$\log_5 (18)$$

11. $\log_2 32 - \log_2 8$

$\log_2 \left(\frac{32}{8}\right)$

$$\log_2 (4)$$

12. $\frac{1}{2}\log_4 25 + \log_4 2$

$\log_4 (25^{1/2})(2)$

$\log_4 (\sqrt{25})(2)$

$$\log_4 (10)$$

Expand each logarithm.

13. $\log_4 \dfrac{m}{n}$

$$\log_4 m - \log_4 n$$

14. $\log_5 \left(x \cdot \sqrt[3]{y}\right)$

$$\log_5 x + \frac{\log_5 y}{3}$$

15. $\log_3 \dfrac{x^4}{y^2}$

$$4\log_3 x - 2\log_3 y$$

Solve each equation.

16. $\sqrt[3]{y^2} = 4$

$y^2 = 4^3$

$y^2 = 64$

$$y = \pm 8$$

17. $2 - 4^x = -62$

$-4^x = -64$

$4^x = 64$

$\log_4 64 = x$

$$x = 3$$

18. $\log x + \log 2 = 5$

$\log (2x) = 5$

$10^5 = 2x$

$100000 = 2x$

$$x = 50000$$

19. $\log_3 (x + 1) = 4$

$3^4 = x + 1$

$81 = x + 1$

$$x = 80$$

20. $\log 4x = -1$

$10^{-1} = 4x$

$0.1 = 4x$

$\boxed{x = 0.025}$

21. $\log 4 - \log x = -2$

$\log \frac{4}{x} = -2$

$10^{-2} = \frac{4}{x}$

$0.01x = 4$

$\boxed{x = 400}$

22. $4 + 5^x = 29$

$5^x = 25$

$\log_5 25 = x$

$\boxed{x = 2}$

23. $\log(2x) = \log(10)$

$2x = 10$

$\boxed{x = 5}$

24. $4^x = 16$

$\log_4 16 = x$

$\boxed{x = 2}$

25. $9^{y-3} = 8$

$\log_9(8) = y - 3$

$0.95 = y - 3$

$\boxed{y = 3.95}$

26. $\log_{\frac{1}{3}} x = 2$

$10^2 = \frac{1}{3}x$

$100 = \frac{1}{3}x$

$\boxed{x = 300}$

27. $2 = \log_4(x+1) = 2$

$4^2 = x + 1$

$16 = x + 1$

$\boxed{x = 15}$

28. You can use the equation $N = k \log A$ to estimate the number of species N that live in a region of area A. The parameter k is determined by the conditions in the region. In a rain forest, 2700 species live in 500 km². How many species would remain if half of the forest area were destroyed by logging and farming?

$N = \#$ of species

$A = $ area

$\dfrac{2700 = K \log(500)}{\log 500} \quad \dfrac{}{\log 500}$
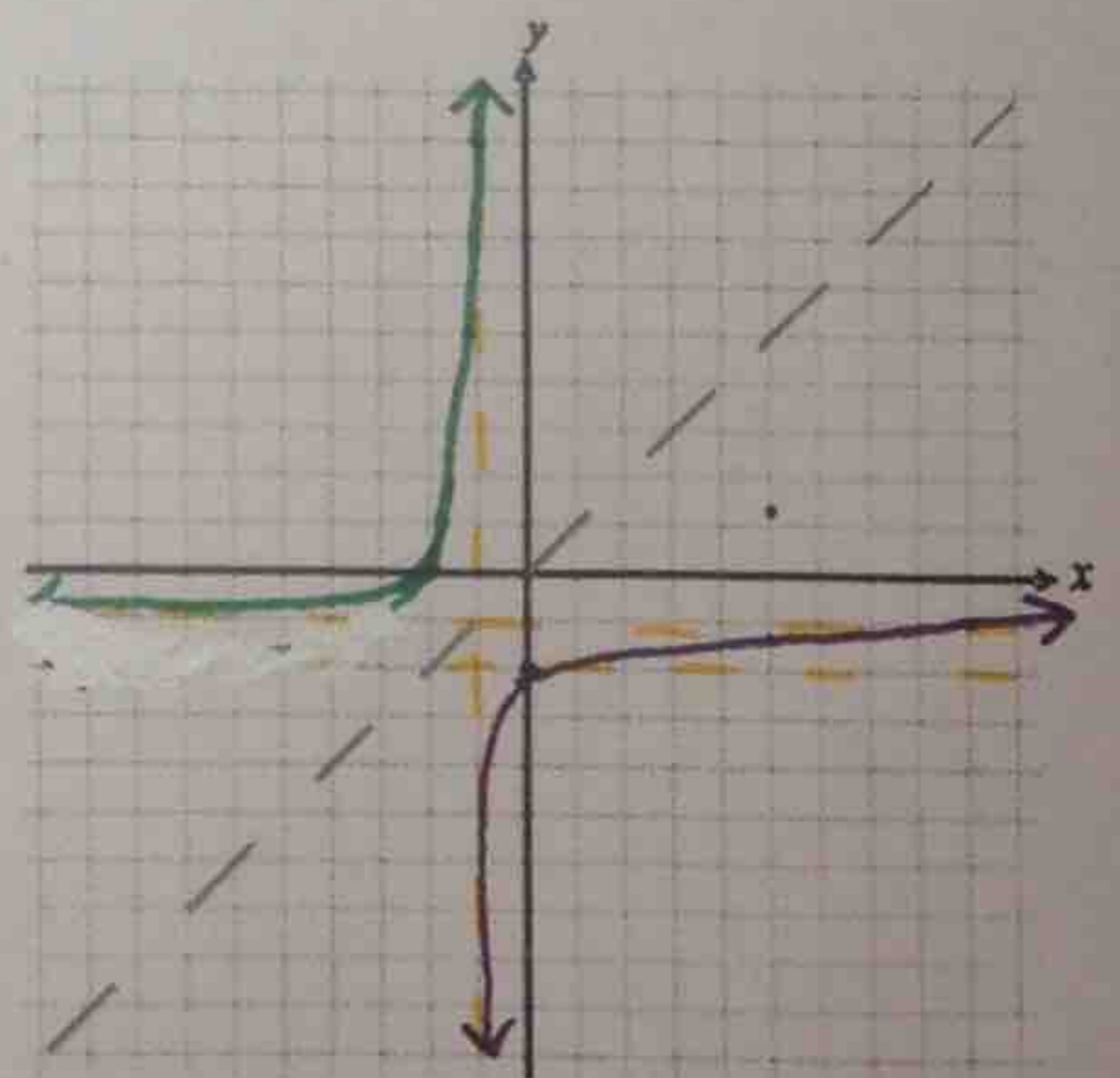
$K = 1000.38$

$N = 1000.38 \log (250)$

$\boxed{N = 2399 \text{ species}}$

29. $f^{-1}(x) = \log(x+1) - 2 \qquad f^{-1}(x) = 10^{x+2} - 1$

x	f(x)
0	-2
5	-1.2
9	-1

x	f⁻¹(x)
-2	0
-1.2	5
-1	9

$\log(y+1) - 2 = x$

$\log(y+1) = x + 2$

$10^{x+2} = y + 1$

$10^{x+2} - 1 = y$

Transformations:

L1, D2

L2, D1

Asymptote:

$x = -1$

$y = -1$

Domain:

$(-1, \infty)$

$(-\infty, \infty)$

Range:

$(-\infty, \infty)$

$(-1, \infty)$