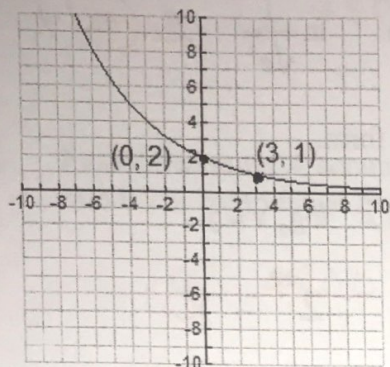


NAME Key

Exp/Log Review

- 1) Determine the exponential function whose graph is shown in the figure.



$$y = ae^{bx}$$

$$2 = ae^{b(0)}$$

$$a = 2$$

$$1 = 2e^{3b}$$

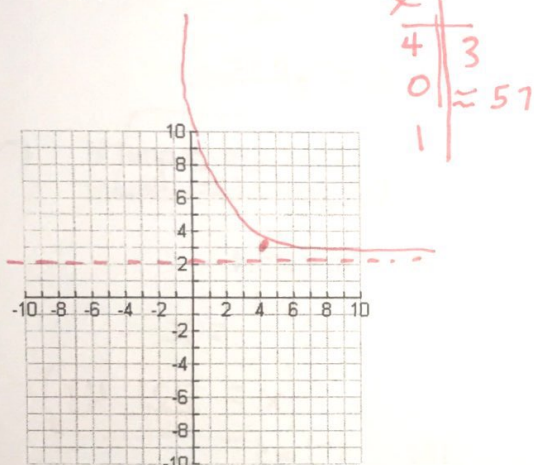
$$\frac{1}{2} = e^{3b}$$

$$b = -.23$$

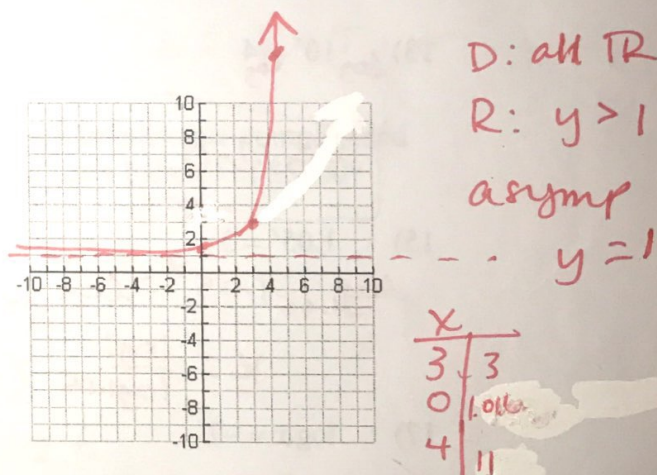
$$y = 2e^{-.23x}$$

Exercises 3 and 4: Graph the following:

3) $y = e^{4-x} + 2$

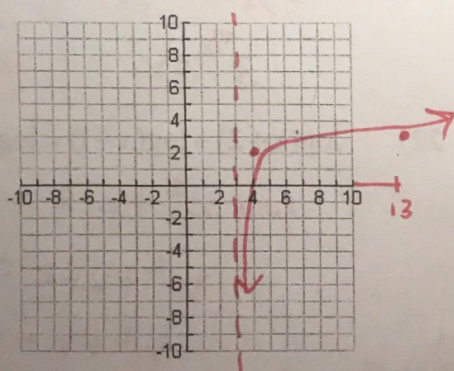


4) $y = 2(5^{x-3}) + 1$

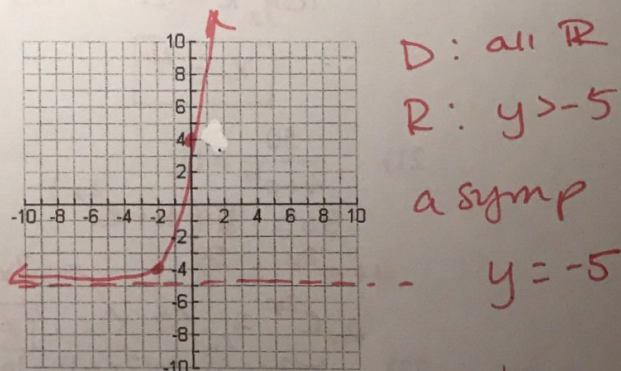


Exercises 5 and 6: Graph the following:

5) $y = \log(x-3) + 2$



6) $y = 3^{x+2} - 5$



Exercises 7 – 10: Evaluate the logarithmic expression without using a calculator.

7) $\log_2 32$

5

8) $\log_3 81$

4

9) $\log \sqrt[3]{10}$

$\frac{1}{3}$

10) $\ln \frac{1}{\sqrt{e^7}}$

$\ln(e^7)^{-1/2} = -\frac{7}{2}$

Exercises 11 – 12: Rewrite the equation in exponential form.

11) $\log_3 x = 5$

$3^5 = x$

$x = 243$

12) $\log_2 x = y$

$2^y = x$

Exercises 13 - 23: Solve the equation.

13) $\log 10^x = 4$

$x = .60$

14) $\ln e^x = 0.25$

$x = -1.39$

15) $1.05^x = 3$

$\log_{1.05} 1.05^x = \log_{1.05} 3$

$x = \frac{\log 3}{\log 1.05} = 22.5$

16) $\ln x = 5.4$

$e^{5.4} = x$

$x = 221.41$

17) $\log x = -7$

$10^{-7} = x$

18) $3^{x-3} = 5$

$\log_3 3^{x-3} = \log_3 5$

$x-3 = \frac{\log 5}{\log 3}$

$x = 4.46$

19) $3\log_2 x + 1 = 7$

$\log_2 x = 2$

$x = 4$

20) $2\log_3 x - 3 = 4$

$\log_3 x = \frac{7}{2}$

$3^{7/2} = x$

$x = 46.77$

21) $\frac{50}{4+e^{2x}} = 11$

$50 = 11(4+e^{2x})$

$4+e^{2x} = \frac{50}{11}$

$\ln e^{2x} = \ln .54$

$2x = -.61$

$x = -.30$

23) $\ln(3x+5) - \ln(2x+1) = \ln 4$

$\ln \frac{3x+5}{2x+1} = \ln 4$

$\frac{3x+5}{2x+1} = 4$

$8x+4 = 3x+5$

$5x = 1$

$x = \frac{1}{5}$

$\log x^2 + x - 2 = \log 4$

$x^2 + x - 2 = 4$

$x^2 + x - 6 = 0$

$(x+3)(x-2) = 0$

$x = -3, 2$

Applications:

- 24) Find the amount A accumulated after investing \$450 for 3 years at an interest rate of 4.6% compounded annually.

$$A = 450 \left(1 + \frac{.046}{1} \right)^{3 \cdot 1} = \$515$$

- 25) Find the amount A accumulated after investing \$4800 for 17 years at an interest rate 6.2% compounded quarterly.

$$A = 4800 \left(1 + \frac{.062}{4} \right)^{4 \cdot 17} = \$13660.81$$

- 26) How long would it take for your investment to double if it is compounded continuously at 8.5% interest rate?

$$\begin{aligned} 2 &= 1 e^{.085 t} \\ \ln 2 &= \ln e^{.085 t} & .69 &= .085 t \\ & & t &= 8.15 \text{ yr} \end{aligned}$$

- 27) If Jane invests \$1500 in a savings account with a 6% interest rate compounded monthly, how long will it take until Jane's amount has a balance of \$5200?

$$5200 = 1500 \left(1 + \frac{.06}{12} \right)^{12 t}$$

$$3.47 = (1.005)^{12 t}$$

$$\log_{1.005} 3.47 = 12 t$$

$$12 t = 249.15$$

$$t = 20.79 \text{ yr}$$

Log Review

Date _____ Period _____

Condense each expression to a single logarithm.

1) $6\log c + 6\log a - 3\log b$

$$\log \frac{c^6 a^6}{b^3}$$

2) $5\ln x + 20\ln y + 5\ln z$

$$\ln(x^5 y^{20} z^5)$$

3) $3\log_3 11 + \frac{\log_3 12}{2} + \frac{\log_3 5}{2}$

$$\log_3 11^3 + \log_3 12^{1/2} + \log_3 5^{1/2}$$

$$\log_3 1331 \sqrt{60} \rightarrow \log_3 2662 \sqrt{15}$$

5) $\log_2 y + 5\log_2 z + \frac{\log_2 x}{3}$

4) $\frac{3\log_6 11}{2} + \frac{\log_6 10}{2} + \frac{\log_6 3}{2}$

$$\log_6 (11^{3/2} \cdot 10^{1/2} \cdot 3^{1/2})$$

$$\log_6 11 \sqrt{330}$$

Expand each logarithm.

6) $\log_5 \sqrt[3]{u \cdot v \cdot w \cdot x}$

$$\frac{1}{3} [\log_5 u + \log_5 v + \log_5 w + \log_5 x]$$

8) $\log_4 \left(\frac{x^2}{y \cdot z} \right)^3$

$$3 [2\log_4 x - (\log_4 y + \log_4 z)]$$

10) $\log_6 \sqrt{a \cdot b \cdot c \cdot d}$

$$\frac{1}{2} (\log_6 a + \log_6 b + \log_6 c + \log_6 d)$$

7) $\log_6 (x^6 \cdot y \cdot z)^2$

$$2 (6\log_6 x + \log_6 y + \log_6 z)$$

9) $\log_2 (a^4 \cdot b \cdot c)^6$

$$6 (4\log_2 a + \log_2 b + \log_2 c)$$