

## Chapter 6 Review WS

Evaluate each expression.

$$1) \log_5 \frac{1}{125} = \frac{\log \frac{1}{125}}{\log 5} = \frac{-2.0969}{.699} \approx -2.99 \approx -3$$

$$2) \log_3 81 \quad 3^{\square} = 81$$

$$\textcircled{4}$$

$$\frac{\log 81}{\log 3} = 4$$

$$3) \log_2 16$$

$$2^{\square} = 16$$

$$\textcircled{4}$$

$$4) \log_7 49^5 \quad 7^{\square} = 49^{\square}$$

$$\frac{\log 49^5}{\log 7} = 10$$

$$7^{\square} = 7^{2 \cdot 5}$$

$$\textcircled{10}$$

Condense each expression to a single logarithm.

$$5) \log_9 x^6 - \log_9 y^3$$

$$\log_9 \frac{x^6}{y^3}$$

$$6) \log_9 6 + \log_9 7 + 3 \log_9 5$$

$$\log_9 (6 \cdot 7 \cdot 5^3)$$

$$\log_9 5250$$

$$7) 5 \log a - 25 \log b$$

$$\log \frac{a^5}{b^{25}}$$

Use a calculator to approximate each to the nearest thousandth.

$$8) \log_3 40$$

$$\frac{\log 40}{\log 3} \approx \textcircled{3.358}$$

$$9) \log_2 23$$

$$\frac{\log 23}{\log 2} \approx \textcircled{4.524}$$

Evaluate each logarithm.

10)  $\log_6 1296^{-2}$

$$\frac{\log 1296^{-2}}{\log 6} =$$

11)  $\log_5 625^3$

$$\frac{\log 625^3}{\log 5}$$

$5^0 = 244,40625$

$\boxed{12}$

Solve each equation.

12)  $\log_3 -2x \ominus \log_3 2 = 1$

$$\log_3 \frac{-2x}{2} = 1$$

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

$$3 = -x$$

$\boxed{x = -3}$

13)  $\log_8 8 \oplus \log_8 (x+5) = \log_8 47$

$$\log_8 8(x+5) = \log_8 47$$

$$8(x+5) = 47$$

$$\begin{array}{r} 8x + 40 = 47 \\ -40 \quad -40 \hline \end{array}$$

$$\frac{8x}{8} = \frac{7}{8}$$

$\boxed{x = 7/8}$

14)  $\log_2 (x+8) \ominus \log_2 2 = \log_2 56$

$$\log_2 \frac{x+8}{2} = \log_2 56$$

$$\frac{x+8}{2} = 56 \cdot 2$$

$$x+8 = 112$$

$\boxed{x = 104}$

Rewrite each equation in exponential form.

15)  $\log_{16} 256 = 2$

$\boxed{16^2 = 256}$

16)  $\log_{11} \frac{1}{121} = -2$

$\boxed{11^{-2} = \frac{1}{121}}$

Rewrite each equation in logarithmic form.

17)  $7^3 = 343$

$\boxed{\log_7 343 = 3}$

$$18) \left(\frac{1}{15}\right)^2 = \frac{1}{225}$$

$$\log_{\frac{1}{15}}\left(\frac{1}{225}\right) = 2$$

- 19) If you invest \$5000 compounded continuously at a rate of 4.8%, how much will you have at the end of 16 years?

$$y = Pe^{rt}$$

$$y = 5000e^{(0.048)(16)}$$

$$y = \$10,777.26$$

- 20) You invest \$1000 at 15% APR for 30 years. How much money do you have?

$$y = a(1+r)^t$$

$$y = 1000(1.15)^{30}$$

$$y = \$66,211.77$$

- 21) A certain bacteria doubles every 20 minutes. The bacteria starts with 25 cells. How many cells are present after 3 hours?

$$y = 25(2)^9$$

$$y = 12,800 \text{ cells}$$

- 22) A car depreciates at a rate of 25%. The car was purchased for \$22,000. How much is the car worth after 11 years?

$$y = a(1-r)^t$$

$$y = 22,000(1-.25)^{11}$$

$$y = 22,000(.75)^{11}$$

$$y = \$929.17$$

23) You invest \$1200 at 9.2% compounded monthly. How much money do you have after 32 years?

$$y = a \left(1 + \frac{r}{n}\right)^{nt} \quad y = 1200 \left(1 + \frac{.092}{12}\right)^{12 \cdot 32}$$

$$y = \$22,535.54$$

24) Solve for x:  $3^x = 20$

$$\log 3^x = \log 20$$

$$x \frac{\log 3}{\log 3} = \frac{\log 20}{\log 3}$$

$$x = 2.727$$

25) Solve for x:  $\ln(x+4) + \ln 7 = 3$

$$\ln 7(x+4) = 3$$

$$e^3 = 7x + 28$$

$$\frac{e^3 - 28}{7} = x$$

$$x = -1.131$$

26) Solve for x:  $2^x + 25 = 57$

$$\frac{2^x + 25}{-25} = \frac{57}{-25}$$

$$2^x = 32$$

$$2^x = 2^5$$

$$x = 5$$

27) Solve for x:  $\frac{200}{500} = \frac{500e^{-.025x}}{500}$

$$.4 = e^{-.025x}$$

$$\ln(0.4) = \ln e^{-.025x}$$

$$\frac{\ln(0.4)}{\ln e} = \frac{-0.025x \ln e}{\ln e}$$

$$\frac{-.916}{-.025} = \frac{-0.025x}{-.025}$$

$$36.65 = x$$

Solve each equation.

28)  $\ln(x+42) + \ln x = \ln 43$

$$\ln x(x+42) = \ln 43$$

$$x^2 + 42x = 43$$

$$x^2 + 42x - 43 = 0$$

$$(x+43)(x-1) = 0$$

$$x = -43 \quad x = 1$$

29)  $\ln 3x - \ln 4 = 5$

$$\ln \frac{3x}{4} = 5$$

$$4 \cdot e^5 = \frac{3x \cdot 4}{4}$$

$$\frac{4e^5}{3} = \frac{3x}{3}$$

$$\frac{4e^5}{3} = x$$

$$197.88 = x$$

30)  $\ln(x+4) - \ln x = 1$

$$\ln \frac{x+4}{x} = 1$$

$$x \cdot e^1 = \frac{x+4}{x} \cdot x$$

$$ex = x+4$$

$$\begin{array}{r} 2.72x = x+4 \\ -1x \quad -1x \\ \hline 1.72x = 4 \\ 1.72 \quad 1.72 \\ \hline x \approx 2.33 \end{array}$$

31)  $\ln(x+2) - \ln x = \ln 25$

$$\ln \frac{x+2}{x} = \ln 25$$

$$\frac{x+2}{x} = 25 \cdot x$$

$$\begin{array}{r} x+2 = 25x \\ -1x \quad -1x \\ \hline 2 = 24x \\ 24 \quad 24 \\ \hline \frac{1}{12} = x \end{array}$$