ASSIGNMENT 15

DYLAN ZWICK'S MATH

Section 9.4

In Exercises 1-24, use properties of logarithms to evaluate the expression without a calculator(If not possible , state the reason)

9.4.1: $\log_{12} 12^3 = 3$

9.4.2: $\log_3 81 = 4$

9.4.3: $\log_4 (\frac{1}{16})^3 = -6$

9.4.5: $\log_5 \sqrt[3]{5} = \frac{1}{3}$

9.4.6: $\ln \sqrt{e} = \frac{1}{2}$

9.4.7: $\ln 14^0 = 0$

9.4.10: $\ln e^7 = 7$

9.4.11: $\log_4 8 + \log_4 2 = 2$

9.4.12: $\log_6 2 + \log_6 3 = 1$

9.4.13: $\log_8 4 + \log_8 16 = 2$

9.4.15: $\log_3 54 - \log_3 2 = 3$

9.4.16: $\log_5 50 - \log_5 2 = 2$

9.4.18: $\log_3 324 - \log_3 4 = 4$

9.4.21: $\ln e^8 + \ln e^4 = 12$

9.4.25: Use $\log_4 2 = 0.500$ to approximate $\log_4 8 \approx 1.5000$

In Exercises 33,35, use $\ln 3 \approx 1.0986, \ln 5 \approx 1.6094$ to approximate the expression.

9.4.33: $\ln 9 \approx 2.1942$

9.4.35: $\ln \frac{5}{3} \approx 0.5108$

In Exercises 41,45, use the properties of logarithms to verify the statement.

9.4.41: $-3 \log_4 2 = \log_4 \frac{1}{8}$

9.4.45: $-3 \ln \frac{1}{7} = \ln 56 - \ln 8$

In Exercises 47-74, use the properties of logarithms to expand the expression.

9.4.47: $\log_3 11x = \log_3 11 + \log_3 x$

9.4.49: $\ln 3y = \ln 3 + \ln y$

9.4.50: $\ln 5x = \ln 5 + \ln x$

9.4.52: $\log_3 x^3 = 3 \log_3 x$

9.4.53: $\log_4 x^{-3} = -3 \log_4 x$

9.4.55: $\log_4 \sqrt{3x} = \frac{1}{2}(log_4 3 + log_4 x)$

9.4.57: $\log_2 \frac{z}{17} = log_2 z - log_2 17$

9.4.60: $\ln \frac{\sqrt{x}}{x+9} = \frac{1}{2}(\ln x + \ln(x+9))$

9.4.63: $\log_4[x^6(x+7)^2] = 6 \log_4 x + 2 \log_4(x+7)$

9.4.67: $\ln \sqrt{x(x+2)} = \frac{1}{2}(\ln x + \ln(x+2))$

9.4.71: $\ln \sqrt[3]{\frac{x^2}{x+1}} = \frac{1}{3}[2\ln x - \ln(x+1)]$

9.4.74: $\log_5 \frac{x^2y^5}{z^7} = 2\log_5 x + 5\log_5 y - 7\log_5 z$

In Exercises 75-100, use the properties of logarithms to condense the expression.

9.4.75: $\log_{12} x - \log_{12} 3 = \log_{12} \frac{x}{3}$

9.4.78: $\log_5 2x + \log_5 3y = \log_5 6xy$

9.4.81: $4\ln b = \ln b^4$

9.4.83: $-2\log_5 2x = \log_5 \frac{1}{4x^2}$

9.4.88: $\ln 6 - 3\ln z = \ln \frac{6}{z^3}$

9.4.90: $4\ln 2 + 2\ln x - \frac{1}{2}\ln y = \ln \frac{16x^2}{\sqrt{y}}$

9.4.93: $2[\ln x - \ln(x+1)] = \ln(\frac{x}{x+1})^2$

9.4.96: $5\log_3 x + \log_3(x-6) = \log_3 x^5(x-6)$

9.4.100: $2\log_5(x+y) + 3\log_5 w = \log_5(x+y)^2w^3$

9.4.105: Simplify $\log_5 \sqrt{50} = 1 + \frac{1}{2}\log_5 2$

9.4.78: The relationship between the number of decibels B and the intensity of a sound I in watts per centimeter squared is given by $B = 10\log_{10} \frac{I}{10^{-16}}$. Use properties of logarithms to write the formula in simpler form, and determine the number of decibels of a thunderclap with and intensity of 10^{-3} watt per centimeter squared. $B = 10(\log_{10} I + 16)$, 130 decibels

Section 9.5

In Exercises 1,3, determine whether each value of x is a solution of the equation.

9.5.1: $3^{2x-5} = 27, (a)x = 1N \quad (b)x = 4Y$

9.5.3: $e^{x+5} = 45, (a)x = -5 + \ln 45Y \quad (b)x \approx -2.1933N$

In Exercises 7-34, solve the equation.

9.5.7: $7^x = 7^3, x = 3$

9.5.8: $4^x = 4^6 x = 6$

9.5.10: $e^{x+3} = e^8, x = 5$

9.5.13: $6^{2x} = 36, x = 3$

9.5.15: $3^{2-x} = 81, x = -2$

9.5.17: $5^x = \frac{1}{125}, x = -3$

9.5.20: $3^{x+2} = \frac{1}{27}, x = -5$

9.5.21: $4^{x+3} = 32^x, x = \frac{3}{4}$

9.5.22: $9^{x-2} = 243^{x+1}, x = -3$

9.5.23: $\ln 5x = \ln 22, x = \frac{22}{5}$

9.5.26: $\log_5 2x = log_5 36, x = 18$

9.5.29: $\log_2(x+3) = \log_2 7, x = 4$

9.5.30: $\log_4(x-8) = \log_4(-4), nosolution$

9.5.31: $\log_5(2x-3) = \log_5(4x-5), nosol.$

9.5.35: Simplify $\ln e^{2x-1} = 2x - 1$

In Exercises 39-118, solve the exponential(log) equation. (Round your answer to two decimal places.)

9.5.39: $3^x = 91, x \approx 4.11$

9.5.40: $4^x = 40, x \approx 2.66$

9.5.42: $2^x = 3.6, , x \approx 1.85$

9.5.45: $7^{3y} = 126, , x \approx 0.83$

9.5.47: $3^{2-x} = 8, , x \approx 0.11$

9.5.50: $12^{x-1} = 324, , x \approx 3.33$

9.5.51: $4e^{-x} = 24, , x \approx -1.79$

9.5.53: $\frac{1}{4}e^x = 5, , x \approx 3.00$

9.5.56: $4e^{-3x} = 6, , x \approx -0.14$

9.5.58: $32(1.5)^x = 640, , x \approx 7.39$

9.5.61: $1000^{0.12x} = 25,000, , x \approx 12.22$

9.5.63: $\frac{1}{5}4^{x+2} = 300, , x \approx 3.28$

9.5.67: $7 + e^{2-x} = 28, , x \approx -1.04$

9.5.70: $6 - 3e^{-x} = -15, , x \approx -1.95$

9.5.72: $10 + e^{4x} = 18, , x \approx 0.52$

9.5.73: $17 - e^{\frac{x}{4}} = 14, , x \approx 4.39$

9.5.83: $\log_{10} x = -1, , x \approx 0.10$

9.5.85: $\log_3 x = 4.7, x \approx 174.77$

9.5.87: $4\log_3 x = 28, , x \approx 2187.00$

9.5.92: $\log_3 6x = 4, , x \approx 13.50$

9.5.93: $\ln 2x = \frac{1}{5}, , x \approx 0.61$

9.5.99: $\frac{3}{4}\ln(x+4) = -2, , x \approx -3.93$

9.5.105: $\log_4 x + \log_4 5 = 2, , x = 3.20$

9.5.109: $\log_5(x+3) - \log_5 x = 1, , x \approx 0.75$

9.5.114: $\log_6(x-5) + \log_6 x = 2, , x = 9.00$

9.5.118: $\log_3 2x + \log_3(x-1) - \log_3 4 = 1$

9.5.123: A deposit of \$ 10,000 is placed in a savings account for 2 years. The interest for the account is compounded continuously. At the end of 2 years, the balance in the account is \$11,051.71. What is the annual interest rate for this account? 5%

9.5.125: Solve the exponential equation $5000 = 2500e^{0.09t}$ for t to determine the number of years for an investment of \$2500 to double in value when compounded continuously at the rate of 9%. 7.7 years

Section 9.6

In Exercises 1-6, find the annual interest rate.

9.6.1,3,5:

Principal	Balance	Time	Compounding
\$ 500	\$1004.83	10 years	Monthly, 7%
\$ 1000	\$36,581.00	40 years	Daily ,9%
\$ 750	\$4234.00	10 years	continuous , 8%

In Exercises 7-12, find the time for the investment to double.

9.6.7,9,12:

Principal	Rate	Compounding
\$900	$5\frac{3}{4}\%$	Quaterly , 9.27 years
\$18,000	8%	continuous , 8.66 years
\$600	9.75%	continuous ,7.11 years

In Exercises 13-18, determine the type of compounding. Solve the problem by trying the type of compounding. Solve the problem by trying the more common types of compounding.

9.6.13,15,18:

Principal	Balance	Time	Rate
\$ 5000	\$8954.24	10 years	6 % , yearly
\$ 750	\$1587.75	10 years	7.5% , continuous
\$ 4000	\$4788.76	2 years	9% , daily

In Exercises, 19,24, find the effective yield.

9.6.19,24:

Rate	Compounding
8%	continuous , 8.33 %
9%	quaterly , 9.31 %

9.6.27: Is it necessary to know the principal P to find the doubling time in Exercises 7-12? NO. Each time the amount is divided by the principal, the result is always 2.

In Exercises 30, 35, find the principal that must be deposited under the specified conditions to obtain the given balance.

9.6.30,35:

Balance	Rate	Time	Compounding
\$ 5000	8 %	5 years	Continuous , \$3351.60
\$ 1000	5 %	1 years	Daily ,\$951.23

9.6.37: you make nomthly deposits of 30 dollars in a saving account at an annual interest rate 8 %, compounded continuously. Find the balance $A = \frac{P(e^{rt}-1)}{e^{(\frac{r}{12})}}$ after 10 years. \$5496.57

9.6.57: The population $P = \frac{11.7}{1+1.21e^{-0.0269t}}$, where t=0 represents 1990. Use the model to predict the population in 2025. 7.949 billion people