ASSIGNMENT 15

DYLAN ZWICK'S MATH 1010 CLASS

1. 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: $\log_{12}(12^3)$

9.4.2: $\log_3(81)$

9.4.3: $\log_4\left(\frac{1}{16}\right)^3$

9.4.5: $\log_5(\sqrt[3]{5})$

9.4.6: $\ln(\sqrt{e})$

9.4.7: $\ln(14^0)$

9.4.10: $\ln(e^7)$

9.4.11: $\log_4(8) + \log_4(2)$

9.4.12: $\log_6(2) + \log_6(3)$

9.4.13: $\log_8(4) + \log_8(16)$

9.4.15: $\log_3(54) - \log_3(2)$

9.4.16: $\log_5(50) - \log_5(2)$

9.4.18: $\log_3(324) - \log_3(4)$

9.4.21: $\ln(e^8) + \ln(e^4)$

9.4.25: Use $\log_4(2) = 0.500$ to approximate $\log_4(8)$

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

9.4.33: $\ln(9)$

9.4.35: $\ln\left(\frac{5}{3}\right)$

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

9.4.41: $-3\log_4(2) = \log_4\left(\frac{1}{8}\right)$

9.4.45: $-3\ln\left(\frac{1}{7}\right) = \ln(56) - \ln(8)$

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

9.4.47: $\log_3(11x)$

9.4.49: $\ln(3y)$

9.4.50: $\ln(5x)$

9.4.52: $\log_3(x^3)$

9.4.53: $\log_4(x^{-3})$

9.4.55: $\log_4(\sqrt{3x})$

9.4.57: $\log_2\left(\frac{z}{17}\right)$

9.4.60: $\ln\left(\frac{\sqrt{x}}{x+9}\right)$

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

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

9.4.71: $\ln\left(\sqrt[3]{\dfrac{x^2}{x+1}}\right)$

9.4.74: $\log_5\left(\dfrac{x^2y^5}{z^7}\right)$

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

9.4.75: $\log_{12}(x) - \log_{12}(3)$

9.4.78: $\log_5(2x) + \log_5(3y)$

9.4.81: $4\ln(b)$

9.4.83: $-2\log_5(2x)$

9.4.88: $\ln(6) - 3\ln(z)$

9.4.90: $4\ln(2) + 2\ln(x) - \dfrac{1}{2}\ln(y)$

9.4.93: $2[\ln(x) - \ln(x+1)]$

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

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

9.4.105: Simplify $\log_5(\sqrt{50})$

9.4.113: 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.

2. Section 9.5

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

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

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

In Exercises 7-34, solve the equation.

9.5.7: $7^x = 7^3$

9.5.8: $4^x = 4^6$

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

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

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

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

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

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

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

9.5.23: $\ln(5x) = \ln(22)$

9.5.26: $log_5(2x) = log_5(36)$

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

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

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

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

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

9.5.39: $3^x = 91$

9.5.40: $4^x = 40$

9.5.42: $2^x = 3.6$

9.5.45: $7^{3y} = 126$

9.5.47: $3^{2-x} = 8$

9.5.50: $12^{x-1} = 324$

9.5.51: $4e^{-x} = 24$

9.5.53: $\dfrac{1}{4}e^x = 5$

9.5.56: $4e^{-3x} = 6$

9.5.58: $32(1.5)^x = 640$

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

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

9.5.67: $7 + e^{2-x} = 28$

9.5.70: $6 - 3e^{-x} = -15$

9.5.72: $10 + e^{4x} = 18$

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

9.5.83: $\log_{10}(x) = -1$

9.5.85: $\log_3(x) = 4.7$

9.5.87: $4\log_3(x) = 28$

9.5.92: $\log_3(6x) = 4$

9.5.93: $\ln(2x) = \frac{1}{5}$

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

9.5.105: $\log_4(x) + \log_4(5) = 2$

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

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

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?

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%.

3. 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
\$ 1000	\$36,581.00	40 years	Daily
\$ 750	\$8267.38	30 years	Continuously

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

9.6.7,9,12:

Principal	Rate	Compounding
\$2500	7.5 %	Monthly
\$18,000	8%	Continuously
\$600	9.75%	Continuously

In Exercises 13-18, determine 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 %
\$ 750	\$1587.75	10 years	7.5%
\$ 4000	\$4788.76	2 years	9%

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

9.6.19,24:

Rate	Compounding
8%	Continuously
9%	Quaterly

9.6.27: Is it necessary to know the principal P to find the doubling time in Exercises 7-12? Explain.

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

	Balance	Rate	Time	Compounding
9.6.30,35:	\$ 5000	8 %	5 years	Continuously
	\$ 1000	5 %	1 year	Daily

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

9.6.57: The population of the world is modeled by the equation $P = \dfrac{11.7}{1+1.21e^{-0.0269t}}$, where P is in billions and $t = 0$ represents 1990. Use the model to predict the population in 2025.