

Exponential and Logarithmic Functions (11TH GRADE)

Place all answers in the blank space provided. **You are not expected to answer all the questions.**

In 1-4, find the exact value of the logarithmic expression without using a calculator.

- _____ 1. $\log_6 \left(\sqrt[7]{6} \right)$
 _____ 2. $\ln(4e^3) + \ln(2e^{-3})$
 _____ 3. $\log_4(4^6) + \log_{10}(10^2) + \log_3(3) - 3\log_7(7)$
 _____ 4. $\ln \left(\frac{e^4 \sqrt{e}}{e^{1/4}} \right)$
 _____ 5. Evaluate $\log_{150}(50)$ to three decimal places.
 _____ 6. Given that $\log_a(10) = .867$ and $\log_a(2) = .257$, find $\log_a(5)$.
 _____ 7. Write the expression $6\log_b(4u+4) + \frac{1}{2}\log_b(u-1) + 4\log_b(3u+3)$ as a single logarithm.
 _____ 8. Use the properties of logarithms to write the expression $\ln \left(\frac{16a^2 - 1}{16a^2 + 1} \right)$ as a sum, difference, and/or multiple of logarithms.
 _____ 9. How long will it take for an investment to double in value if it earns 8% per year compounded continuously? Round your answer to the nearest whole number.

For problems 10-16, solve each equation. Give exact answers.

- _____ 10. $\log_6 \left(\frac{3x}{x-1} \right) = 1$
 _____ 11. $\log_6(x^2 - 6x) = 1$
 _____ 12. $\log_8(2x) = \log_8(4) + \log_8(x^2 - 4)$
 _____ 13. $7\log_9(x+8) = 7$
 _____ 14. $\ln(x) = \frac{1}{4}(\ln(4) + 2\ln(4))$
 _____ 15. $\ln(x) + \ln(x-1) = \ln(6)$
 _____ 16. $\ln(7+x) = \ln(4)$
 _____ 17. Solve for x given $6^{x+5} = 7^{2x-1}$ to three decimal places.
 _____ 18. Solve $\frac{e^x + e^{-x}}{4} = 1$.
 _____ 19. Solve $6e^{4x} = 2.25$ to three decimal places.
 _____ 20. A newly found radioactive substance has a half-life of 30 years. Presently there are 1500 grams of the substance. How many grams will be left after 42 years? Express the answer to the nearest gram.