
MATH 11009: Exam #3 (Spring 2009)

1. Evaluate each logarithm. **Exact answers only.**

(a) $\log_8 4 =$

(b) $\log_{1/2} 32 =$

2. Rewrite the expression $\log_7 3x = 4$ in exponential form.

3. Use the Change of Base Formula and a calculator to evaluate $\log_{11} 14$ correct to four decimal places.

4. Rewrite the following expression as a single logarithm.

$$4 \ln(x + 5) - 7 [\ln x - 2 \ln(x + 4)]$$

5. Use the Laws of Logarithms to rewrite the expression in a form with no logarithm of a product, quotient, or power where possible.

$$\log_7 \frac{\sqrt{x-10}}{x^3(x-1)^9}$$

6. Solve for x . Give **BOTH** the exact answer and a decimal approximation, accurate to four decimal places.

(a) $6^{3x-2} = 5$

(b) $4(3 + e^{2x}) = 28$

7. Solve the following logarithmic equations. **Exact answers only.**

(a) $\log_3(x - 8) + \log_3 x = 2$

(b) $4 - \ln(x + 5) = 0$

8. On January 31, 1986, an earthquake which had a magnitude of 5.0 occurred in Lake County, east of Cleveland, which resulted in cracked plaster and masonry, broke windows, and caused changes in water wells. Express the intensity of this earthquake in terms of I_0 .

$$R = \log \left(\frac{I}{I_0} \right)$$

9. If \$17,250 is invested in an account paying 4.25% interest per year, compounded monthly, how much will be in the account after 5 years? (Round answers to two decimal places.)
10. If after 7 years an account has a balance of \$35,678.93, find the amount of principal invested if the account pays 5.5% interest compounded continuously. (Round answers to two decimal places.)
11. The rabbit population at a local park grows exponentially. The current population is 15 rabbits and the relative growth rate is 19.15% per year. The rabbit population P after t years is modeled using $P(t) = 15e^{0.1915t}$.
- (a) Find the projected rabbit population after 5 years. (Round answer to the nearest whole unit.)
- (b) Find the number of years required for the rabbit population to reach 90 rabbits. (Round answer to two decimal places.)

ANSWERS

1. (a) $\frac{2}{3}$ (b) -5
2. $3x = 7^4$
3. 1.1006
4. $\ln \frac{(x+5)^4(x+4)^{14}}{x^7}$
5. $\frac{1}{2} \log_7(x-10) - 3 \log_7 x - 9 \log_7(x-1)$
6. (a) See HW #5
(b) $x = \frac{\ln 4}{2} \approx 0.6931$
7. (a) $x = 9$ (NOTE: $x = -1$ does not check)
(b) $x = e^4 - 5$
8. $I = 100,000I_0$
9. $A = \$21,326.21$
10. $P = \$24,277.75$
11. (a) 39 rabbits
(b) 9.36 years