

Math 12 – Precalculus – Chapter 10 Review Problems

1. Rewrite the equation $-1 = \log_{16}(x+4)$ in equivalent exponential form, then solve for x . Finally, use a calculator to approximate x to the nearest hundredth.
2. Rewrite the equation $2^{x-1} + 3 = 8$ in equivalent logarithmic form, then solve for x . Finally, use a calculator to approximate x to the nearest hundredth.
3. Rewrite the expression
 - a. $\log\left(\frac{10}{3x^n}\right)$ without any exponentiation, multiplication or division.
 - b. $\ln 1 + \frac{1}{2}\ln(e-x) - \ln(x)$ as a single logarithm.
4. Given $f(x) = 2e^{x/3} - 8$.
 - a. Find a formula for the inverse function, $y = f^{-1}(x)$.
 - b. Find the intercepts and asymptotes of $f(x)$.
 - c. Find the intercepts and asymptotes of $f^{-1}(x)$.
 - d. Sketch a graphing showing $y = f(x)$ and $y = f^{-1}(x)$ together and illustrating the symmetry through $y = x$.
5. Solve the equation for x .
 - a. $8 + 4^{0.125x} = 24$
 - b. $2^{1-x^2} = \frac{1}{8}$
 - c. $1 + \log(17x + 104) = 2$
 - d. $\log_3(8-x) + \log_3(x+4) = 3$
6. Suppose the Gorkon population on planet Xorda in April of 1999 was 1380, and it is estimated that the population will increase by 2% every 400 years.
 - a. Assuming a natural growth model for the Gorkons, when will their population have grown to 2000?
 - b. By what percentage will the population grow in 1800 years?
7. If \$300 is invested at 3.65% annual interest rate compounded daily, how long will it take to reach a value of \$500?
8. Actinium has a half life of about 7.04×10^8 years. How long will it take a 1 gram sample to decay to one milligram (one thousandth of a gram).
9. Find an exponential function (of the form $f(x) = a \cdot b^x$) which passes through the points (0,3) and (2,5).
10. Rewrite the equation $-2 = \log_8(x-4)$ in equivalent exponential form, then solve for x . Finally, use a calculator to approximate x to the nearest hundredth.
11. Rewrite the equation $2^{x+3} - 1 = 8$ in equivalent logarithmic form, then solve for x . Finally, use a calculator to approximate x to the nearest hundredth.
12. Rewrite the expression
 - a. $\ln\left(\frac{e}{3x^n}\right)$ without any exponentiation, multiplication or division.
 - b. $\log 1 + \frac{1}{2}\log(10-x) - \log(x)$ as a single logarithm.

13. Given $f(x) = 2e^{x/3} - 8$.
- Find a formula for the inverse function, $y = f^{-1}(x)$.
 - Find the intercepts and asymptotes of $f(x)$.
 - Find the intercepts and asymptotes of $f^{-1}(x)$.
 - Sketch a graphing showing $y = f(x)$ and $y = f^{-1}(x)$ together and illustrating the symmetry through $y = x$.
14. Solve the equation for x .
- $8 + 4^{0.125x} = 24$
 - $2^{1-x^2} = \frac{1}{8}$
 - $1 + \log(17x + 104) = 2$
 - $\log_3(8 - x) + \log_3(x + 4) = 3$
15. If \$300 is invested at 3.65% annual interest rate compounded daily, how long will it take to reach a value of \$500?
16. Actinium has a half life of about 7.04×10^8 years. How long will it take a 1 gram sample to decay to one milligram (one thousandth of a gram).
17. Find an exponential function (of the form $f(x) = a \cdot b^x$) which passes through the points (0,2) and (3,6).
18. Suppose money is invested in a bank account paying 3% annual interest, compounded monthly.
- What is the interest rate per month?
 - What is the effective annual interest rate? That is, by what percent does the money actually grow in a year? Round to the nearest thousandth of a percent.
19. The population of California was 10727724 in 1940 and 23510720 in 1995. Assume the population grows exponentially.
- What is the relative annual growth rate, that is, find the value of r so that $P(t) = 10727724e^{rt}$ models that population of California t years after 1940. Round to the nearest hundredth of a percent.
 - According to this model, in what year will the population of California reach 1 billion?
20. The value of a particular investment follows a pattern of exponential growth. In the year 2000, you invested money in a money market account. The value of your investment t years after 2000 is given by the exponential growth model $f(t) = 7200e^{0.046t}$. By what percentage is the account increasing each year? What was the original investment? In what year will the investment be worth \$10,892?
21. The logistic growth function $P(t) = \frac{320}{1 + 5.4e^{-0.24t}}$ describes the population of a species of butterflies t months after they are introduced into a non-threatening habitat. How many butterflies are expected in the habitat after 11 months? How many butterflies were initially introduced? What is the maximum number of butterflies predicted by this model? Sketch a graph for the population function showing intercept(s) and asymptote(s).
22. A life insurance company uses the following rate table for annual premiums for women for term life insurance. Fit an exponential function to the data. Predict the annual premium for a woman aged 70 years.

Age	35	40	45	50	55	60	65
Premium	\$103	\$133	\$190	\$255	\$360	\$503	\$818