Key

Algebra 2 Review
Chapter 8B

Write a continuous exponential function to model the situation.

1. \$27,000 purchase that lost 12% in value each year. $y = 27000\left(e^{-0.12x}\right)$

2. \$5000 investment that had an annual increase of 8.5% each year. $y = 5000\left(e^{0.085x}\right)$

3. Write $e^5 = 148.413$ in logarithmic form. $5 = \ln(148.413)$

4. Write $\ln 625 \approx 6.44$ in exponential form. $625 = e^{6.44}$

5. Find the decimal approximation for: $\log_3 42$ 3.4022

6. If $\log t = 12$ and $\log n = 3$ evaluate $\log\left(tn^2\right)$ $= \log t + 2\log n = 12 + 2(3) = 18$

7. Write $3\ln 2 + \ln x - \ln y$ as a single logarithm $= \ln 2^3 + \ln x - \ln y = \ln\left(\frac{8x}{y}\right)$

Solve each equation or inequality.

8. $\ln(x+3) + \ln(x+2) = \ln(6)$

$\ln(x+3)(x+2) = \ln 6$

$x^2 + 5x + 6 = 6$

$x^2 + 5x = 0$

$x(x+5) = 0$

$\boxed{x = 0}$ $\cancel{x = -5}$ can't use

9. $\ln\boxed{(x+5)} < \ln\boxed{(7-x)}$

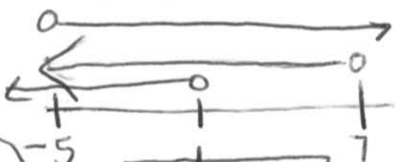
$x + 5 < 7 - x$

$2x < 2$

$x < 1$

$x + 5 > 0$ $7 - x > 0$

$x > -5$ $7 > x$



$\boxed{-5 < x < 1}$

Round all answers to three decimal places.

10. Find the $\log 125.357$ ≈ 2.0981

11. Find x if $\log x = 1.8597$ $x = 72.3936$

12. Find the $\ln 71.4$ ≈ 4.2683

13. Find x if $\ln x = 5.831$ $x = 340.6992$

Solve the following equations and inequalities

14. $3.5^x = 47.9$ $x = 3.0885$

$x \log 3.5 = \log 47.9$

$x = \dfrac{\log 47.9}{\log 3.5}$

15. $2^{x+1} < 5^{2x-1}$

$(x+1)\log 2 < (2x-1)\log 5$

$x\log 2 + \log 2 < 2x\log 5 - \log 5$

$x\log 2 - 2x\log 5 < -\log 2 - \log 5$

$x(\log 2 - 2\log 5) < -\log 2 - \log 5$

$x > \dfrac{-\log 2 - \log 5}{\log 2 - 2\log 5}$ $x > 0.9117$

16. $2e^x - 7 = 131$

$2e^x = 138$

$\ln e^x = \ln 69$

$x = 4.2341$

Solve the following story problems.

17. Suppose \$3000 is invested at a 3% annual percentage rate and it is compounded continuously. How much will the investment be worth in 18 years?

$y = 3000 * e^{.03(18)} = 3000 * e^{0.54} = \$5148.02$

18. A substance decomposes radioactively and it has a half-life is 10 days, what is the continuous rate of decay per day?

$50 = 100e^{r(10)}$

$\ln .5 = \ln e^{10r}$

$\dfrac{\ln(.5)}{10} = \dfrac{10r}{10}$

$r = -.0693$

Decay of 6.93%

19. The population of rabbits in an area is modeled by the growth function $P = 6e^{0.26t}$, where P is in thousands and t is in years. How long will it take for the population to reach 20,000 (or 20)?

$t = 4.63$ yrs

$\dfrac{20}{6} = \dfrac{6e^{.26t}}{6}$

$\ln\frac{10}{3} = \ln e^{.26t}$

$\dfrac{\ln\left(\frac{10}{3}\right)}{.26} = \dfrac{.26t}{.26}$

20. Suppose the population of a certain endangered species decreases continuously every year. You have counted 90 of these animals in the habitat you are studying. If it took 14 years for the population to decrease to 15 animals, what was the rate of decay?

$\dfrac{15}{90} = \dfrac{90e^{r(14)}}{90}$

$\ln\frac{1}{6} = \ln e^{14r}$

$\dfrac{\ln\left(\frac{1}{6}\right)}{14} = \dfrac{14r}{14}$

$r = -0.12798$

Decay of 12.8%