Exponents, Logs and Equations

A. Solve the following exponential equations.

1. $9^{5x+3} = 9^{-3x+7}$
2. $64^{3x} = 16^{2x-9}$
3. $(3^{2x})^{x+1} = 27^{x+3}$
4. $\left(49^{x}\right)^{x+1} = \left(7^{x-3}\right)^{2}$
5. $25^{3x-7} \cdot 625^{6x+3} = 125^{2x} \cdot 5^{5x-7}$

B. Solve the following log equations:

1. $\log_2 x = 7$
2. $\log_x 5 = 3$
3. $\log_3 7 = x$
4. $\log_5 2 - \log_5 8 = \log_5 x$
5. $\log 7 + \log x = \log 49$
6. $8\log x - 3\log x = \log 32$
7. $\log(x^2 + 21x) = 2$
8. $2 = \log_3(9x+10) - \log_3(5n)$
9. $\log_3(x^3 - 1) - \log_3(x^2 + x + 1) = \log_3 12$
10. $\log_3(x-3) + \log_3(x+2) = 7$
11. $\log(3x^2+4) - \log(2x-2) = \log(x) + \log 4$
12. $\log_8 11 = \log_3 x$
13. $\ln(x+1) - \ln x = \ln 2$
14. $\ln x + 3\sqrt{\ln x} = 10$
15. $\ln\left(8x^3 - 216\right) - \ln(4x^2 + 12x + 36) = 2$
16. $6\ln x - 4\ln x = 4$

C. Solve the following exponential equations: (Use logs on questions 1 – 4 and natural logs on questions 5 – 8)

1. $5^{4x+1} = 13$
2. $7^{2x} = 11 \bullet 3^{x-1}$
3. $(121)^{5x+2} = 35\left(8^{3x}\right)$
4. $(26)^{x^2+2x} = 703$
5. $3^{3x} = 11^{x+1}$
6. $17^{2x-5} = 31 \cdot 2^{-3x+6}$
7. $8^{2x^2+3} = 13^{5x-1}$
8. $5^{\frac{1}{2}x} \cdot 3^{\frac{2}{3}} = \sqrt[5]{7^{2x}}$

D. Solve the following equations using the appropriate formulas

$A = Pe^{rt}, N = N_o(2)^{\frac{x}{T}}, N = N_o k^t$

1. The population of a single-celled organism in a pond triples every 5 days. If the initial count was 600 and the final count is 4100 how many days have passed?

2. After 500 years there are 6 pounds of radioactive material remaining from an original sample of 4781 pounds. What is the half life of this material?

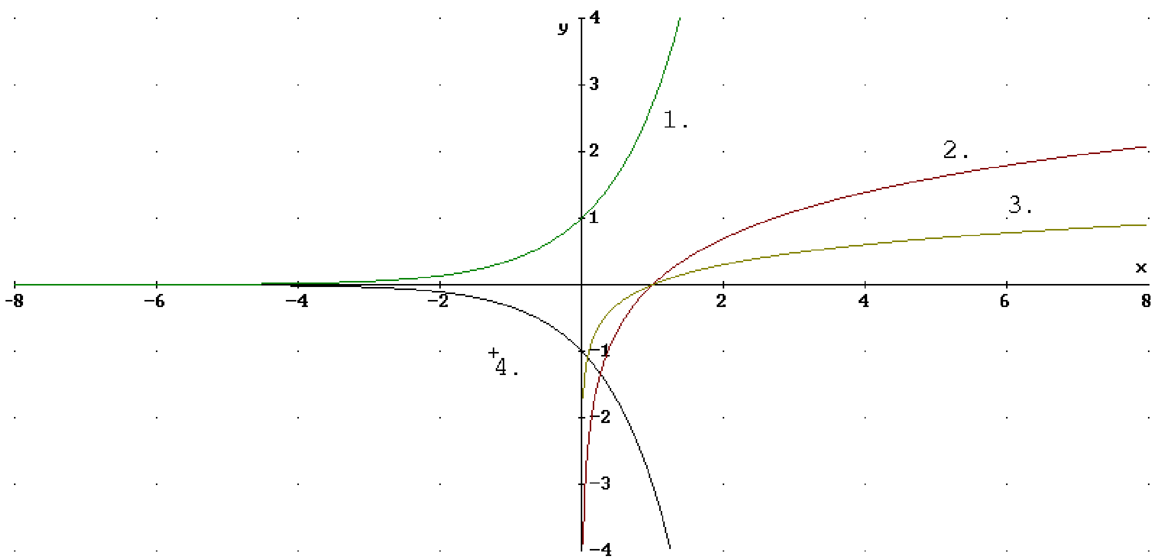
3. At what rate of interest compounded continuously will $1200 triple in 17 years?

E. Simplify the following expression using logs

$$\frac{125 * 0.0345 * \sqrt[4]{513}}{1698 * \sqrt{8912} * (0.014)^{\frac{2}{3}}}$$

F. Match graph and equation

a) $y = -3^x$ b) $y = \ln x$ c) $y = e^x$ d) $y = \log x$



G. Definition of natural log and the development of the constant "e".