College Algebra
Chapter 4 REVIEW
(solutions at www.elmermath.weebly.com)

Formulas: $A = P(1 + \frac{r}{n})^{nt}$ $\qquad A = Pe^{rt}$ $\qquad a^x = b$ iff $\log_a b = x$ $\qquad \log_a xy = \log_a x + \log_a y$

$\log_a \frac{x}{y} = \log_a x - \log_a y$ $\qquad a^{\log_a x} = x$ $\qquad \log_a a^x = x$ $\qquad \log_a x^n = n\log_a x$ $\qquad x = y$ iff $\log_a x = \log_a y$

$\log_a 1 = 0$ $\qquad \log_a a = 1$ $\qquad \log_a x = \dfrac{\log_b x}{\log_b a}$

Solve the equation. If necessary, round to the nearest thousandth.

1) $4^{(9 - 3x)} = 64$

2) $\log_x \sqrt[3]{5} = \dfrac{1}{3}$

3) $\log_9 \dfrac{1}{729} = x$

4) $\log_4 x = -2$

5) $2x = 7^{\log_7 6}$

6) $6^{x+1} = 4^{2x - 1}$

7) $e^{9x} e^{6x} = e^5$

Solve the equation and express the solution in exact form.

8) $\log(5 + 4x) - \log(3 + x) = \log 3$

9) $\log(x + 9) = 1 - \log x$

10) $\log(x + 10) = 1 + \log(4x - 3)$

Find the future value.

11) $2897 invested for 6 years at 4.3% compounded quarterly

Find the present value of the future value.

12) $11,000, invested for 9 years at 3% compounded quarterly

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13) Given $\log_k A = 1.300$ and $\log_k B = 0.257$, find $\log_k\left(\dfrac{A}{B}\right)$

14) Given $\log_b 4 = 1.0596$, evaluate $\log_b(4b)$

15) The growth in the population of a certain rodent at a dump site can be modeled by the exponential function $A(t) = 808e^{0.02t}$, where t is the number of years since 1982. Estimate the population in the year 2000.

16) The population growth of an animal species is described by $F(t) = 25 \log(3t + 2)$ where t is measured in months. Find the population of this species in an area 9 months after the species is introduced.

17) What is the half-life of a radioactive substance that decays according to the model $A(t) = A_0 e^{-0.05t}$, where t is the amount of radioactive material remaining from an initial amount A_0 at a given time t?

18) One measure of living standard in the US is given by $L = 9 + 2e^{0.15t}$ where t is the number of years since 1982. In what year whas the standard of living equal to 31?

19) At what interest rate must $4500 be compounded annually to equal $7602.66 after 9 yr? (Round to the nearest percent.)

20) A skydiver in free fall travels at a speed modeled by $v(t) = 176(1 - e^{-0.18t})$ feet per second after t seconds. How long will it take for the skydiver to attain a speed of 147 ft per sec (100 mph)?

21) The function A gives the amount of radioactive material, in grams, present after t day. Round answers to the nearest tenth of a gram
   a) If $A(t) = 200e^{-0.12t}$, find the amount left after 10 days
   b) If $A(t) = 875e^{-0.76t}$, find the half-life.
   c) If $A(t) = A_0 e^{-0.024t}$, find the half-life.

22) A certain radioactive isotope has a half-life of approximately 1700 years. How many years to the nearest year would be required for a given amount of this isotope to decay to 25% of that amount?