Solve each equation

1) $\log_4(x+2)=\log_4 8$	2) $-2\log_4 x=\log_4 9$	3) $\ln x+\ln(x+2)=4$
4) $\ln(x+1)-\ln x=2$	5) $2\log_3(x+4)-2=2$	6) $\log_4 x+\log_4(x-3)=1$
7) $2^x=10$	8) $3^x=14$	9) $3+2e^{-x}=6$
10) $3(4)^{x/2}=96$	11) $2(10)^{-x/3}=20$	12) $2^{x+1}=5^{1-2x}$

In 13-16, approximate the logarithm using the properties of logarithms, given that $\log_b 2\approx 0.3562$, $\log_b 3\approx 0.5646$, and $\log_b 5\approx 0.8271$. Round your result to four decimal places.

13) $\log_b 25$	14) $\log_b 30$	15) $\log_b \sqrt{3}$	16) $\log_b\left(\frac{25}{9}\right)$

Use a graphing calculator to solve each equation.

17) $e^x=-x$	18) $\ln x=x^3-1$	19) $e^x-\ln x=4$

For #20 and #21, use $A=A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ for radioactive decay, where A_0 represents initial amount and h represents the half-life of the given substance.

20) The half-life of radium is 1690 years. If 10 grams are present now, how much will be present in 50 years? When will there be 3.5 grams remaining?

21) The half-life of radioactive potassium is 1.3 billion years. If 20 grams are present now, how much will be present in 1000 years? When will there be 15 grams remaining?

22) The size P of a certain insect population at time t (in days) obeys the function $P(t)=500e^{0.002t}$.

a) Determine the number of insects at $t=0$ days.
b) What is the population after 10 days?
c) When will the insect population reach 800?

23) The population of the United States in 2000 was 282 million people and was growing at a rate of 1.1% per year. Assuming that this growth rate continues, when will the population the United States be 303 million people? When will the population be 355 million people?

24) The value of a certain automobile can be modeled by $V(t)=14{,}512(0.82)^t$.

a) Is the value of the car decreasing or increasing? What is the % growth/decay rate?
b) According to the model, when will the car be worth $9000?
c) According to the model, when will the car be worth $2000?

25) For selected years from 1985 to 2004, the average salary y (in thousands of dollars) for public school teachers for the year t can be modeled by the equation $y=-1.562+14.584\ln t$, where $t=5$ represents 1985. During which year did the average salary for public school teachers reach $44,000?

Answers:

1) $x=6$	2) $x=\frac{1}{3}$	3) $x=-1+\sqrt{1+e^4}$	4) $x=\frac{1}{e^2-1}$	5) $x=5$
6) $x=4$	7) $x=\frac{\ln 10}{\ln 2}$	8) $x=\frac{\ln 14}{\ln 3}$	9) $x=\ln\left(\frac{2}{3}\right)$	10) $x=5$
11) $x=-3$	12) $x=\frac{\ln 5-\ln 2}{\ln 50}$			