Note: The solution to each problem is underneath the NEXT question!

1) The value of a car y (in thousands of dollars) can be approximated by the model $y = 31(0.92)^t$, where t is the number of years since the car was new. Estimate when the value of the car will be $9600?

A #8

2009 − 2000

$t = 9$

$$y = 1.6(1.0176)^t$$

$$y = 1.6(1.0176)^9$$

$$y = 1.87$$

$\boxed{\text{1.87 million}}$

2) In 2000, the population of a city was about 1.04 million. During the next 14 years, the population increased by about 2.05% each year. Write an exponential growth model giving the population (in millions) t years after 2000. Estimate the city's population in 2008.

A #1

$9600 = 9.6 Thousand

$$y = 31(0.92)^t$$

$$\frac{9.6}{31} = \frac{31(0.92)^t}{31}$$

$$0.31 = (0.92)^t$$

$$\log_{0.92} 0.31 = t$$

$$t = \frac{\log 0.31}{\log 0.92}$$

$$t = 14.05 \approx 14$$

$\boxed{\text{14 years later}}$

Note: The solution to each problem is underneath the NEXT question!

3) In 2000, the population of a city was about 1.04 million. During the next 14 years, the population increased by about 2.05% each year. Write an exponential growth model giving the population (in millions) t years after 2000. Estimate the year when the city's population was 1.3 million.

A #2

$2008 - 2000 = t$

$t = 8$

$y = 1.04(1.0205)^t$

$y = 1.04(1.0205)^8$

$y = 1.22$

$\boxed{1.22 \text{ million}}$

4) The amount, in grams, of the radioactive isotope barium-140 remaining after t days is $y = a(0.5)^{\frac{t}{13}}$, where a in the initial amount in grams. What percent of the barium-14 decays each day?

A #3

$y = 1.04(1.0205)^t$

$1.3 = 1.04(1.0205)^t$

$1.25 = (1.0205)^t$

$\log_{1.0205} 1.25 = t$

$t = \frac{\log 1.25}{\log 1.0205}$

$t = 10.99 \approx 11$ years

$2000 + 11$

$\boxed{2011}$

Note: The solution to each problem is underneath the NEXT question!

5) You deposit $8600 into an account that pays 1.32% annual interest. Find the balance after 4 years when the interest is compounded quarterly.

A#4

$$y = a(0.5)^{t/13}$$

$$y = a(0.5)^{\frac{1}{13}\cdot t}$$

$$y = a(0.5^{1/13})^t$$

$$y = a(\underline{0.95})^t$$

$$y = a(\underline{1-r})^t$$

$$1 - r = 0.95$$

$$r = 0.05$$

$$\boxed{5\% \text{ decay}}$$

6) You deposit $8600 into an account that pays 1.32% annual interest. Find the balance after 4 years when the interest is compounded daily.

A#5

$$A = p\left(1 + \frac{r}{n}\right)^{nt}$$

$$A = 8600\left(1 + \frac{0.0132}{4}\right)^{4\cdot 4}$$

$$A = 9065.49$$

$$\boxed{\$9065.49}$$

Note: The solution to each problem is underneath the NEXT question!

7) The value of a car (in thousands) can be approximated by the model $y = 24(0.83)^t$. Estimate when the value of the car will be $6500.

A #6

$$\cancel{Y}A = p\left(1+\frac{r}{n}\right)^{nt}$$

$$A = 8600\left(1+\frac{0.0132}{365}\right)^{365\cdot 4}$$

$$A = 9066.27$$

$$\boxed{\$9066.27}$$

8) In 2000, the population of a city was about 1.6 million. During the next 15 years, the population increase by about 1.76% each year. Write an exponential growth model giving the population y (in millions) t years after 2000. Estimate the city's population in 2009.

A #7

Be careful! Units are in thousands!

$6500 = 6.5 thousand

$$y = 24(0.83)^t$$

$$\frac{6.5}{24} = \frac{24(0.83)^t}{24}$$

$$.271 = 0.83^t$$

$$\log_{0.83} .271 = t$$

$$t = \frac{\log .271}{\log 0.83}$$

$$t = 7.01 \approx 7$$

$$\boxed{\text{after 7 years}}$$