Word Problem Day Ch7

Name Key

1. (7.1) In 1970, the population of Napa Valley, California, was about 350,000. From 1970 to 2000, the population grew at an average annual rate of about 3.45%. Write an exponential growth model giving the population of Napa Valley t years after 1970. About how many people lived in Napa Valley in 1995?

$y = 350{,}000(1 + .0345)^t$

817,203

2. (7.1) You deposit $7500 in an account that pays 3.25% annual interest. Find the balance after 2 years if it is compounded monthly.

$A = 7500\left(1 + \frac{.0325}{12}\right)^{12 \cdot 2}$

$8002.99

3. (7.1) The cost of going to the movie theater has increase from $6 to $10.50 in the last 7 years. What is the percent increase?

$10.5 = 6(1+r)^7$

$1.75 = (1+r)^7$

$2.71 = 1 + r$

$1.71 = r$

4. (7.2) A new motorcycle cost $35,000. The value of the motorcycle decreases by 18% each year. Write an exponential decay model giving the motorcycles annual value after t years. Estimate the value after 4 years.

$y = 35000(1 - .18)^4$

$y = \$15824.26$

5. (7.2)You buy a Yadier Molina baseball card for $50. If the card increases in value at a rate of 15% each year, how much was it initially worth 8 years ago.

$50 = a(1 + .15)^8$

$50 = a \cdot 3.06$

$a = \$16.34$

6. (7.3) You deposit $4500 in an account that pays 5% annual interest compounded continuously. What is the balance after 3 years?

$A = 4500e^{(.05)(3)}$

$A = \$5228.25$

7. (7.4) Once a hurricane reaches land, the wind speed s (in knots) within the hurricane is related to the time t (in hours) the hurricane remains over land. For one particular hurricane, this relationship can be modeled by $y = -57.1 \log t + 121$

a.) ~~Graph the model in your graphing calculator and make a sketch.~~

b.) How fast are the wind speeds after the hurricane has been on land for 1 hour?

$y = -57.1 \log_0 1 + 121$ $y = 121$

c.) How long after the hurricane reaches land are the wind speeds about 80 knots?

8. (7.6) You deposit $500 in an account that pays 3.25% annual interest compounded monthly. How long does it take for the balance to quadruple?

$2000 = 500\left(1 + \frac{.0325}{12}\right)^{12t}$

$4 = 1.0027^{12t}$ $\log_{1.0027} 4 = 12t$

$t = 42.85$ yrs

9. (7.6) You deposit $700 in an account that pays 2.75% annual interest. How long does it take the balance to reach $2000 when it is compounded continuously?

$2000 = 700e^{.0275t}$

$2.86 = e^{.0275t}$

$\ln 2.86 = .0275t$ $t = 38.21$ yrs

10. (7.6) You invest $1000 into an account at 4% interest compounded continuously. How long would it take for your money to double?

$2000 = 1000e^{.04t}$

$2 = e^{.04t}$

$\ln 2 = .04t$ $t = 17.33$ yrs