MCR3U

3.7 Exponential Applications Homework Handout

1. A tennis ball is dropped from a height of 8m. If the ball touches the ground and bounces back to about 40% of the maximum height of the previous bounce, determine the height after 3 bounces.

2. A sample of 200 bacteria doubles every 15 minutes. How many bacteria will be in the sample after 1½ hours?

3. A bacteria culture doubles in size every 15 minutes. How long (in minutes), will it take for a culture of 20 bacteria to grow to a population of 163 840?

4. Determine the annual rate of depreciation if your stock value decreases from $1 280 000 to $745 000 in 12 years.

5. A lottery winner gets $40 million in the local lottery. They spend a constant fraction of their remaining winnings each year, and declare bankruptcy in 17 years. What percentage of their winnings did they spend each year (assuming bankruptcy is at $1)?

6. The use of wind turbines to generate electrical energy in Europe has increased exponentially. The energy produced by wind turbines between 1980 and 1995 can be modeled by the equation $y = 9\left(\frac{3}{2}\right)^x$ where x is the number of years since 1980 and y is the number of gigawatt hours of energy produced. In what year was 30.375 GWh produced?

7. After 5 years your investment is now worth $2954.90. If it appreciated at a rate of 3.4%/a, what was your initial investment?

8. Determine the annual growth factor if a population of 7000 grows to 17500 in 3 years.

9. A car was purchased for $32 500. The car depreciates at 15% per year. How much should the car be sold for, in 5 years, to not lose money?

10. Suppose an original sample of tungsten-187 has a mass of 64mg. If its half life is 4 days, determine how long it would take for the sample to decay to 2mg.

11. The number of wolves in a particular region is decreasing at a rate of 6.5% each year. If there are 1400 wolves after 10 years, how many were there initially?

12. At birth, $500 is deposited in an account paying 10%/a. How many years will it take for the amount to reach $732.05?

13. The Consumer Price Index (CPI) tells us the average increase or decrease in price over one year. If the CPI decreased by 1.25% last year, and that trend continued, what would the selling price of a stereo be in two years if it sold for $698 last year?

14. If a population increases by 2.6% each year, determine the population in 2004 if the population in 1998 was 3 642 250.

15. Population growth can be modeled with an exponential function. Maplesville's population was 35000 in 1995 and 37500 in 2005. What will the population in 2013 be if this trend continues?

16. A sample of bacteria doubles every 20 minutes. How long would it take the number of bacteria to grow from 140 to 35 840?

Solutions:

1. 51.2 cm	2. 12 800	3. 195 min	4. 4.4%	5. 64.3%	6. 1983
7. $2500	8. 35.7%	9. $14 420.42	10. 20 days	11. 2742	12. 4 years
13. $672.15	14. 4 248 679	15. 39628 (or 39627)		16. 2 h 40 min	