

Section 12.3 (Day 2)—Exponential Growth and Decay

1. The population of Johnson City in 2005 was 25000. Since then, the population has grown at an average rate of 3.2% each year. Write an equation to represent the population of Johnson City since 2005. What will the population of Johnson City be in 2015?

$$25000(1 + 0.032)^{10}$$

$$= 34256$$

2. Determine the value of an investment of \$2500 if it is invested at an interest rate of 5.25% compounded monthly for 4 years.

$$2500 \left(1 + \frac{0.0525}{12} \right)^{12 \cdot 4}$$

$$= 3082.78$$

3. Determine the value of an investment of \$100000 if it is invested at an interest rate of 5.2% compounded quarterly for 12 years.

$$100000 \left(1 + \frac{0.052}{4} \right)^{4 \cdot 12}$$

$$185888.87$$

4. The population of Bulgaria has been decreasing at an annual rate of 0.89%. If the population of Bulgaria was about 7,450,349 in the year 2005, predict its population in the year 2015.

$$7450349(1 - 0.0089)^{10}$$

$$= 6813204 \text{ people}$$

5. Mr. Gossell is a machinist. He bought some new machinery for about \$125,000. He wants to calculate the value of the machinery over the next 10 years for tax purposes. If

the machinery depreciates at the rate of 15% each year, what is the value of the machinery (to the nearest \$100) at the end of 10 years?

$$125000(1 - .15)^{10}$$

$$24609.30 = 24600$$

6. A new car costs \$32,000. It is expected to depreciate 12% each year for 4 years and then depreciate 8% each year thereafter. Find the value of the car in 6 years.

$$(4 \text{ yrs}) \rightarrow 32000(1 - .12)^4 = 19190.25$$

$$+ \frac{(2 \text{ yrs}) \rightarrow 19190.25(1 - .08)^2 = 16242.63}{6 \text{ yrs}}$$

7. Hans opens a savings account by depositing \$1200 in an account that earns 3% interest compounded weekly. How much will his investment be worth in 10 years? (Use 52 weeks in a year and round answer to the nearest hundredth.)

$$1200 \left(1 + \frac{.03}{52}\right)^{52 \cdot 10}$$

$$= 1619.69$$

8. Ken and Barbie bought a condominium in Malibu for \$500,000 in 2010. If its value appreciates at an average rate of 6% each year, what will the value be in 2015?

$$500000(1 + .06)^5$$

$$= 669112.79$$

9. Kyle saved \$500 from a summer job. He plans to spend 10% of his savings each week on various forms of entertainment. At this rate, how much will Kyle have left after 15 weeks?

$$500(1 - .10)^{15} = 102.95$$