

HW:

Pages 335-338: 1, 3, 7, 13, 17, 21

Pages 324-326: 12-28 m/4, 42, 68

- 1. Growth of an Insect Population** The size P of a certain insect population at time t (in days) obeys the model $P(t) = 500e^{0.02t}$.
- Determine the number of insects at $t = 0$ days.
 - What is the growth rate of the insect population?
 - Graph the function using a graphing utility.
 - What is the population after 10 days?
 - When will the insect population reach 800?
 - When will the insect population double?
- 7. Population Growth** The population of a southern city follows the exponential law.
- If N is the population of the city and t is the time in years, express N as a function of t .
 - If the population doubled in size over an 18-month period and the current population is 10,000, what will the population be 2 years from now?
- 17. Decomposition of Chlorine in a Pool** Under certain water conditions, the free chlorine (hypochlorous acid, HOCl) in a swimming pool decomposes according to the law of uninhibited decay. After shocking his pool, Ben tested the water and found the amount of free chlorine to be 2.5 parts per million (ppm). Twenty-four hours later, Ben tested the water again and found the amount of free chlorine to be 2.2 ppm. What will be the reading after 3 days (that is, 72 hours)? When the chlorine level reaches 1.0 ppm, Ben must shock the pool again. How long can Ben go before he must shock the pool again?
- 13. Radioactive Decay** Strontium 90 is a radioactive material that decays according to the function $A(t) = A_0e^{-0.024t}$, where A_0 is the initial amount present and A is the amount present at time t (in years). Assume that a scientist has a sample of 500 grams of strontium 90.
- What is the decay rate of strontium 90?
 - Graph the function using a graphing utility.
 - How much strontium 90 is left after 10 years?
 - When will 400 grams of strontium 90 be left?
 - What is the half-life of strontium 90?
- 13. Cooling Time of a Pizza** A pizza baked at 450°F is removed from the oven at 5:00 PM and placed in a room that is a constant 70°F . After 5 minutes, the pizza is at 300°F .
- At what time can you begin eating the pizza if you want its temperature to be 135°F ?
 - Using a graphing utility, graph the relation between temperature and time.
 - Using INTERSECT, determine the time that needs to elapse before the pizza is 160°F .
 - TRACE the function for large values of time. What do you notice about y , the temperature?
- 21. Radioactivity from Chernobyl** After the release of radioactive material into the atmosphere from a nuclear power plant at Chernobyl (Ukraine) in 1986, the hay in Austria was contaminated by iodine 131 (half-life 8 days). If it is safe to feed the hay to cows when 10% of the iodine 131 remains, how long did the farmers need to wait to use this hay?

Pages 324-326:

In Problems 7-14, find the amount that results from each investment.

- 12.** \$700 invested at 6% compounded daily after a period of 2 years

In Problems 15-22, find the principal needed now to get each amount; that is, find the present value.

- 16.** To get \$75 after 3 years at 8% compounded quarterly
- 20.** To get \$300 after 4 years at 3% compounded daily

In Problems 23-26, find the effective rate of interest.

- 24.** For 6% compounded monthly

In Problems 27-30, determine the rate that represents the better deal.

- 28.** 9% compounded quarterly or $9\frac{1}{4}\%$ compounded annually

- 42. Time Required to Reach a Goal** How many years will it take for an initial investment of \$25,000 to grow to \$80,000? Assume a rate of interest of 7% compounded continuously.

- 68. Time to Reach an Investment Goal** The formula

$$t = \frac{\ln A - \ln P}{r}$$

can be used to find the number of years t required for an investment P to grow to a value A when compounded continuously at an annual rate r .

- How long will it take to increase an initial investment of \$1000 to \$8000 at an annual rate of 10%?
- What annual rate is required to increase the value of a \$2000 IRA to \$30,000 in 35 years?
- Give a derivation of this formula.