6.2 Differential Equations - Growth and Decay

Name: Date: August 9, 2015

P 2. Solve the differential equation.

$$\frac{dy}{dx} = 5 - 8x$$

P 4. Solve the differential equation.

$$\frac{dy}{dx} = 6 - y$$

P 6. Solve the differential equation.

$$y' = -\frac{\sqrt{x}}{4y}$$

P 8. Solve the differential equation.

$$y' = x(1+y)$$

P 10. Solve the differential equation.

$$xy + y' = 100x$$

P 16. Find the function $y = f(t)$ passing through the point $(0, 10)$ with the given first derivative.

$$\frac{dy}{dt} = -9\sqrt{t}$$

P 18. Find the function $y = f(t)$ passing through the point $(0, 10)$ with the given first derivative.

$$\frac{dy}{dt} = \frac{3}{4}y$$

P 20. The rate of change of P is proportional to P. When $t = 0$, $P = 5000$ and when $t = 1$, $P = 4750$. What is th evalue of P when $t = 5$.

P 37. Radioactive radium has a half-life of approximately 1599 years. What percent of a given amount remains after 100 years?

P 46. Find the principal P that must be invested at rate 7.5%, compounded monthly, so that $\$1,000,000$ will be available for retirement in 20 years.

P 50. Find the time necessary for \$1000 to double when it is invested in a rate of 5.5% compounded

(a) annually,

(b) monthly,

(c) daily, and

(d) continuously

P 56. The number of bacteria in a culture is increasing according to the law of exponential growth. There are 125 bacteria in the culture after 2 hours and 350 bacteria after 4 hours.

(a) Find the initial population.

(b) Write an exponential growth model for the bacteria population. Let t represent time in hours.

(c) Use the model to determine the number of bacteria after 8 hours.

(d) After how many hours will the bacteria count be 25,000?