PRACTICE PROBLEM SET 34

Now try these problems. The answers are in Chapter 21.

1. If $\frac{dy}{dx} = \frac{7x^2}{y^3}$ and $y(3) = 2$, find an equation for y in terms of x.

2. If $\frac{dy}{dx} = 5x^2 y$ and $y(0) = 6$, find an equation for y in terms of x.

3. If $\frac{dy}{dx} = \frac{1}{y + x^2 y}$ and $y(0) = 2$, find an equation for y in terms of x.

4. If $\frac{dy}{dx} = \frac{e^x}{y^2}$ and $y(0) = 1$, find an equation for y in terms of x.

5. If $\frac{dy}{dx} = \frac{y^2}{x^3}$ and $y(1) = 2$, find an equation for y in terms of x.

6. If $\frac{dy}{dx} = \frac{\sin x}{\cos y}$ and $y(0) = \frac{3\pi}{2}$, find an equation for y in terms of x.

7. A colony of bacteria grows exponentially and the colony's population is 4,000 at time $t = 0$ and 6,500 at time $t = 3$. How big is the population at time $t = 10$?

8. A rock is thrown upward with an initial velocity, $v(t)$, of 18 m/s from a height, $h(t)$, of 45 m. If the acceleration of the rock is a constant -9 m/s^2, find the height of the rock at time $t = 4$.

9. The rate of growth of the volume of a sphere is proportional to its volume. If the volume of the sphere is initially 36π ft^3, and expands to 90π ft^3 after 1 second, find the volume of the sphere after 3 seconds.

10. A radioactive element decays exponentially proportionally to its mass. One-half of its original amount remains after 5,750 years. If 10,000 grams of the element are present initially, how much will be left after 1,000 years?

11. Use Euler's Method, with $h = 0.25$, to estimate $y(1)$ if $y' = y - x$ and $y(0) = 2$.

12. Use Euler's Method, with $h = 0.2$, to estimate $y(1)$ if $y' = -y$ and $y(0) = 1$.

13. Use Euler's Method, with $h = 0.1$, to estimate $y(0.5)$ if $y' = 4x^3$ and $y(0) = 0$.

14. Sketch the slope field for $\frac{dy}{dx} = 2x$.

15. Sketch the slope field for $\frac{dy}{dx} = -\frac{x}{y}$.

16. Sketch the slope field for $\frac{dy}{dx} = \frac{x}{y}$.