

5-4 Videos Guide

5-4a

- Description of differential equation

Exercises:

- Solve the differential equation.
 - $y' = 3xy$
 - $\frac{dy}{dx} = x\sqrt{y}$

5-4b

- $\frac{du}{dt} = \frac{1+t^4}{ut^2+u^4t^2}$
- $\frac{dz}{dt} + e^{t+z} = 0$
- Find the solution of the differential equation that satisfies the given initial condition.
 $\frac{dy}{dx} = \frac{x \sin x}{y}, \quad y(0) = -1$

5-4c

- Population growth model
 - $P(t) = P(0)e^{kt}$, where $P(0)$ is the initial population and k is the constant relative growth rate

5-4d

Exercise:

- Find the orthogonal trajectories of the family of curves. Use a graphing device to draw several members of each family on a common screen.
 - $y^2 = kx^3$
 - $y = \frac{1}{x+k}$

5-4e

Exercise:

- A tank contains 1000 L of pure water. Brine that contains 0.05 kg of salt per liter of water enters the tank at a rate of 5 L/min. Brine that contains 0.04 kg of salt per liter of water enters the tank at a rate of 10 L/min. The solution is kept thoroughly mixed and drains from the tank at a rate of 15 L/min. How much salt is in the tank (a) after t minutes and (b) after one hour?