

9.3 - Separable [Differential] Equations

9.3a

Description of differential equation

Exercises:

Solve the differential equation.

$$y' = 3xy$$

$$\frac{dy}{dx} = x\sqrt{y}$$

9.3b

$$\frac{du}{dt} = \frac{1+t^4}{ut^2+u^4t^2}$$

$$\frac{dz}{dt} + e^{t+z} = 0$$

Find the solution of the differential equation that satisfies the given initial condition.

$$\frac{dy}{dx} = \frac{x \sin x}{y}, y(0) = -1$$

9.3c

Population growth model

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

9.3d

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.

$$y^2 = kx^3$$

[illegible]

$$y = \frac{1}{x + k}$$

[illegible]

9.3e

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?

