

Calculus BC

Section 6.2 - Differential Equations - Growth and Decay

- Obj: - To use separation of variables to solve a simple differential equation.
- To use exponential functions to model growth and decay in applied problems.

1. Solve the differential equation

$$\frac{dy}{dx} = (1 + y^2)e^x$$

- separate the variables,
x with dx, y with dy
- left side w.r.t dy
- right side w.r.t dx
- solve for y (optional)

2. Solve the differential equation

$$\frac{dy}{dx} = ky \quad \text{-the rate of change of } y \text{ is } \underline{\hspace{2cm}} \text{ to } y$$

3. An experimental population of fruit flies grows exponentially according to the equation in problem 2. There were 100 flies after the second day and 300 after the fourth day. Find the original population of flies.

Initial condition 1:

Initial condition 2:

Which variable represents the original population?

Newton's Law of Cooling: the rate of change in the temperature of an object is proportional to the difference between the object's temperature and the surrounding

temperature. $\frac{dy}{dx} =$ or $y' =$

Solve the differential equation.

4. Let y represent the temperature of an object in a room with constant temperature of 60° . If the object cools from 100° to 90° in ten minutes, how much longer will it take for the object to cool to 80° ?