

## 9.3 - Separable [Differential] Equations

### 9.3a

Description of differential equation

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#### Exercises:

Solve the differential equation.

$$y' = 3xy$$

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

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

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

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

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### 9.3c

Population growth model

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$P(t) = P(0)e^{kt}$ , 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.

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$$y^2 = kx^3$$

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

### 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

[illegible]

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