

## Lecture Title

### Note

This template is designed for MAT232 lecture notes. Replace this content with your specific lecture details.

## Key Concepts

### Definition

A **parametric equation** is a set of equations that express the coordinates of the points of a curve as functions of a variable, called a parameter.

## Examples

### Example

**Example 1:** Consider the parametric equations:

$$x = t, \quad y = t^2, \quad t \in \mathbb{R}.$$

- At  $t = 0$ ,  $(x, y) = (0, 0)$ .
- At  $t = 1$ ,  $(x, y) = (1, 1)$ .

This describes a parabola.



Figure 1: Sample image illustrating the concept.

## Theorems and Proofs

### Theorem

**Theorem:** If  $x(t)$  and  $y(t)$  are differentiable functions, the slope of the curve is given by:

$$\frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}, \quad \text{provided } \frac{dx}{dt} \neq 0.$$



Figure 2: Graphical representation of the theorem.

## Additional Notes

### Note

Always check the domain of the parameter  $t$  when solving problems involving parametric equations.

## Further Visualization



Figure 3: Additional visualization for parametric curves.