# Calculus in Physics

Your Name

## 1 Introduction

This document covers the application of calculus in physics.

## 2 Kinematics

### 2.1 Velocity and Acceleration

### 2.2 Example Problem

A particle's position is given by $x(t) = t^3 - 3t^2 + 2t$. Find its velocity and acceleration at time $t = 2$.

**Solution**

The velocity is the derivative of the position:

$$v(t) = \frac{dx}{dt} = 3t^2 - 6t + 2.$$

At $t = 2$:

$$v(2) = 3(2)^2 - 6(2) + 2 = 12 - 12 + 2 = 2.$$

The acceleration is the derivative of the velocity:

$$a(t) = \frac{dv}{dt} = 6t - 6.$$

At $t = 2$:

$$a(2) = 6(2) - 6 = 12 - 6 = 6.$$