# Lab 9

Introduction to RC Circuits in the Time and Frequency-Domains

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# 1 Introduction

This lab explored the behavior of RC (resistor-capacitor) circuits in time and frequency domains to understand their response to different input signals, essential in applications like signal processing and filtering. In Part 1, the transient response of an RC circuit was investigated using a square wave input to observe the exponential charging and discharging of the capacitor, governed by the time constant $\tau = RC$. Adjustments in input frequency enabled full charge and discharge cycles, revealing insights into the circuit's time-domain behavior. Part 2 analyzed the frequency response with a sine wave input across various frequencies, demonstrating frequency-dependent changes in output voltage magnitude and phase shift. These findings provided a foundational understanding of RC circuits' responses across different conditions.

# 2 Results

## 2.1 Transient Signals with an RC Circuit with Square Waves

## 2.2 A Simple RC Circuit with Sine Waves

# 3 Discussion and Conclusion

# 4 References

[1] Dr. Iman Salama. "Lab 9 – Introduction to RC Circuits in the Time and Frequency-Domains" Northeastern University. 8 November 2024.