**CMPE 323: Signals and Systems**

**Dr. LaBerge**

**Lab 02 Report:**

**Sinusoids, Time Delays, Time Scaling**

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1. **Introduction**

The convolution sum

and the convolution integral

can be easily implemented with precision on MATLAB using its built in method . This lab will allow other ways to estimate the sum and integral to simulate similar results to gain a better understanding algorithmically and mathematically.

1. **Equipment**

A computer with MATLAB installed.

1. **Procedure**
   1. **Simple Pulses**

Using a time array , create two unit amplitude pulses and . Write a MATLAB script to perform the convolution sum, . Plot the two input pulses, the convolution sum, and the convolution integral after solving it separately. Explain any difference between the convolution sum and the analytic result.

Redo the four plots using the built-in MATLAB method, . How should the plot be scaled as to bring the third and fourth plots into approximate agreement?

* 1. **Unequal Pulses**

Redo Part 3.1, replacing with . Explain any changes that occur.

* 1. **Offset Input**

Redo Part 3.1, replacing with . Explain any changes that occur.

* 1. **Offset Input and Offset Impulse Response**

Redo Part 3.1, replacing with and with . Explain any changes that occur, and if the output makes sense.

* 1. **Linear Time Invariant Characteristic**

Using the pulse anonymous function, create inputs that demonstrate that the convolution is linear and time invariant.

1. **Results**

**Figure 1: x(t) with a 2π Delay Demonstrating a Time Delay Corresponding to a Frequency Dependent Phase Shift**