CS CM 182 Lab 2

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I completed this written part of the homework, lab report, or exam entirely on my own.
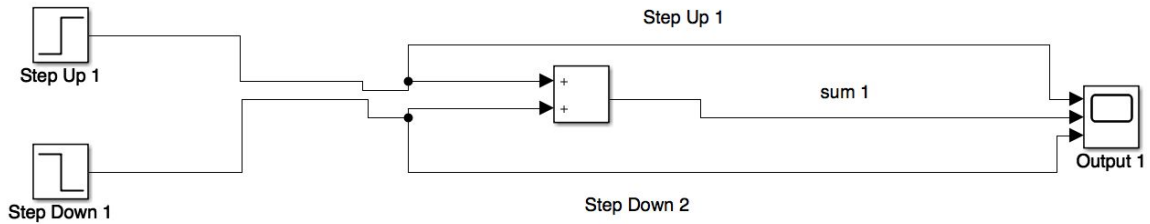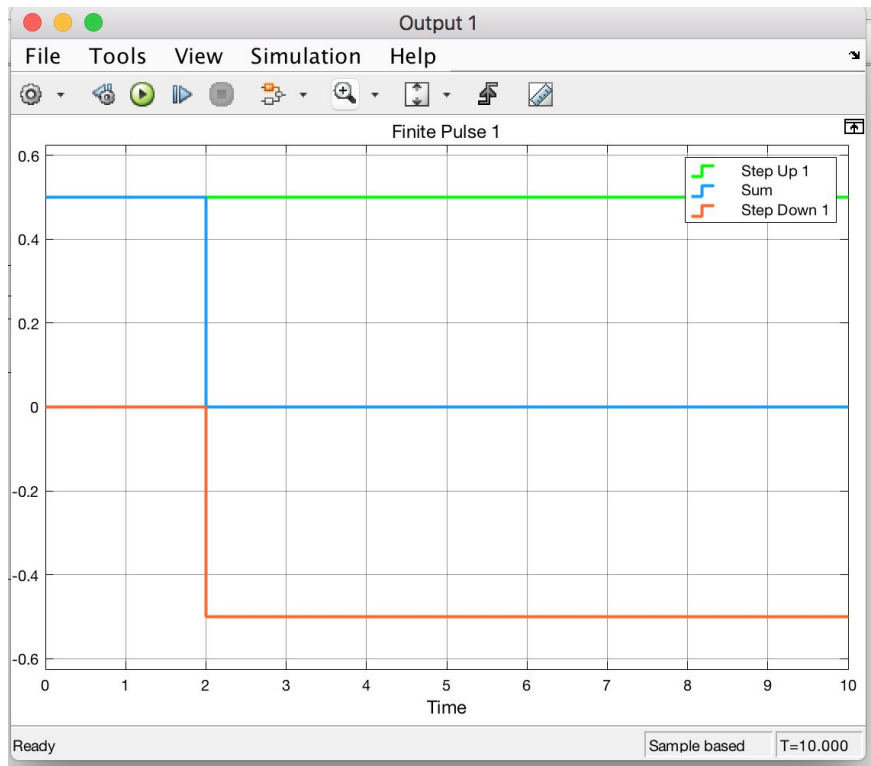
Exercise 1

Create a finite pulse of area = 1 as the sum of two step inputs. The width of the pulse is 2 seconds. Plot the two step inputs and the sum on the same plot (three lines).

Simulink

Plot

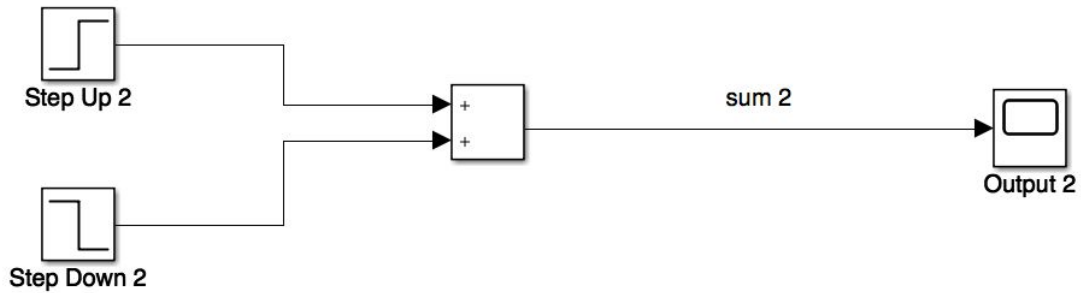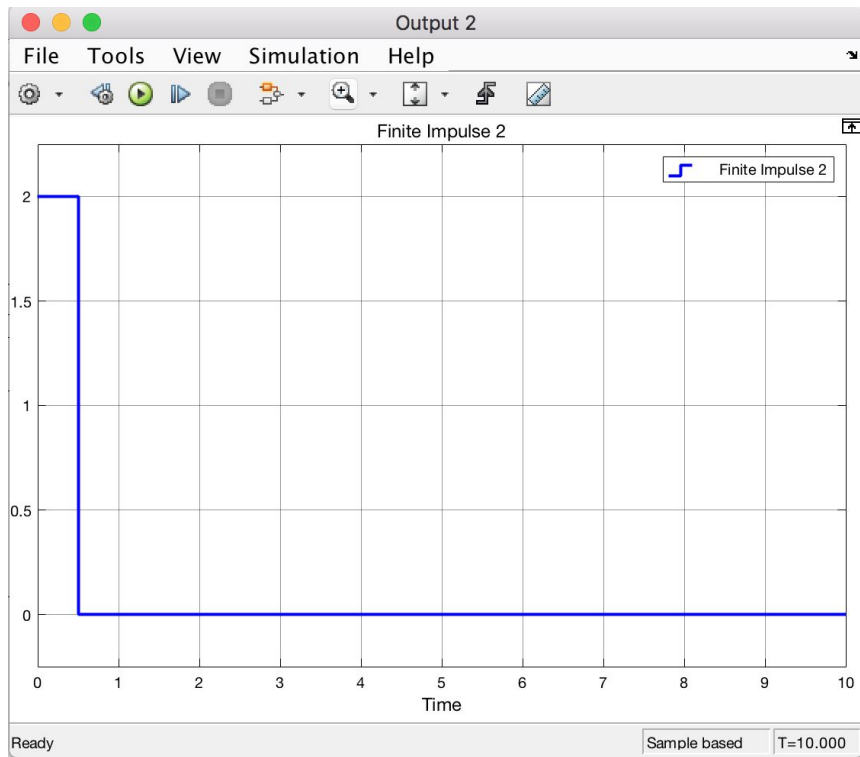## Exercise 2

Create a finite pulse of area = 1 as the sum of two step inputs. The width of the pulse is 0.5 seconds. Plot the sum.
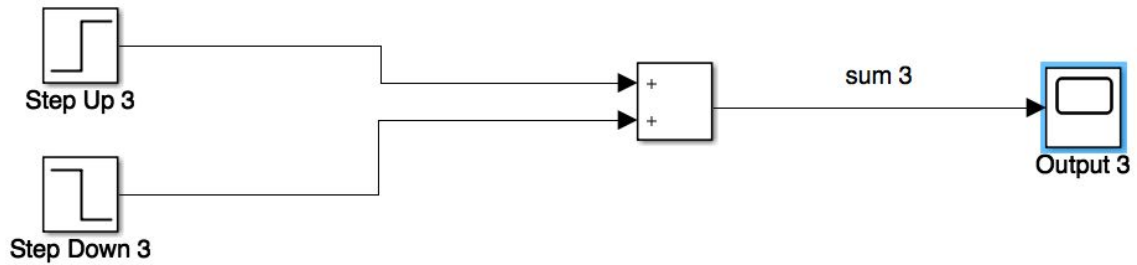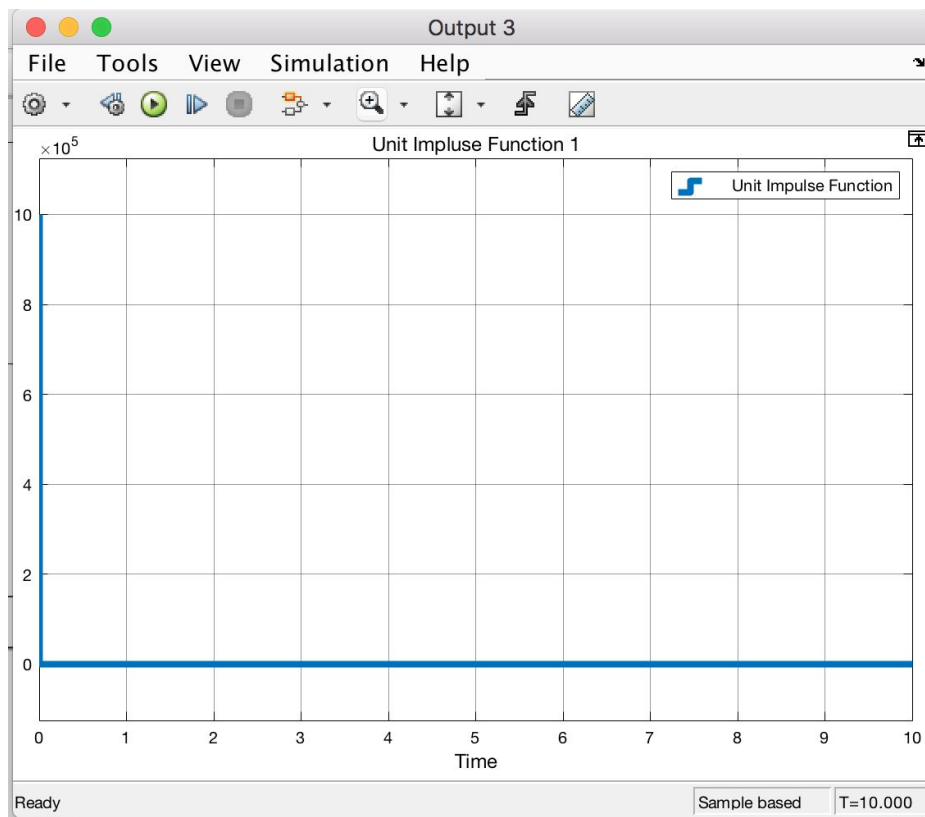
Simulink

Plot

Exercise 3

Approximate a unit impulse function $\delta(t)$ by creating a finite pulse of area = 1 with a tiny width. The width of the pulse is 0.000001 seconds. Plot the sum.
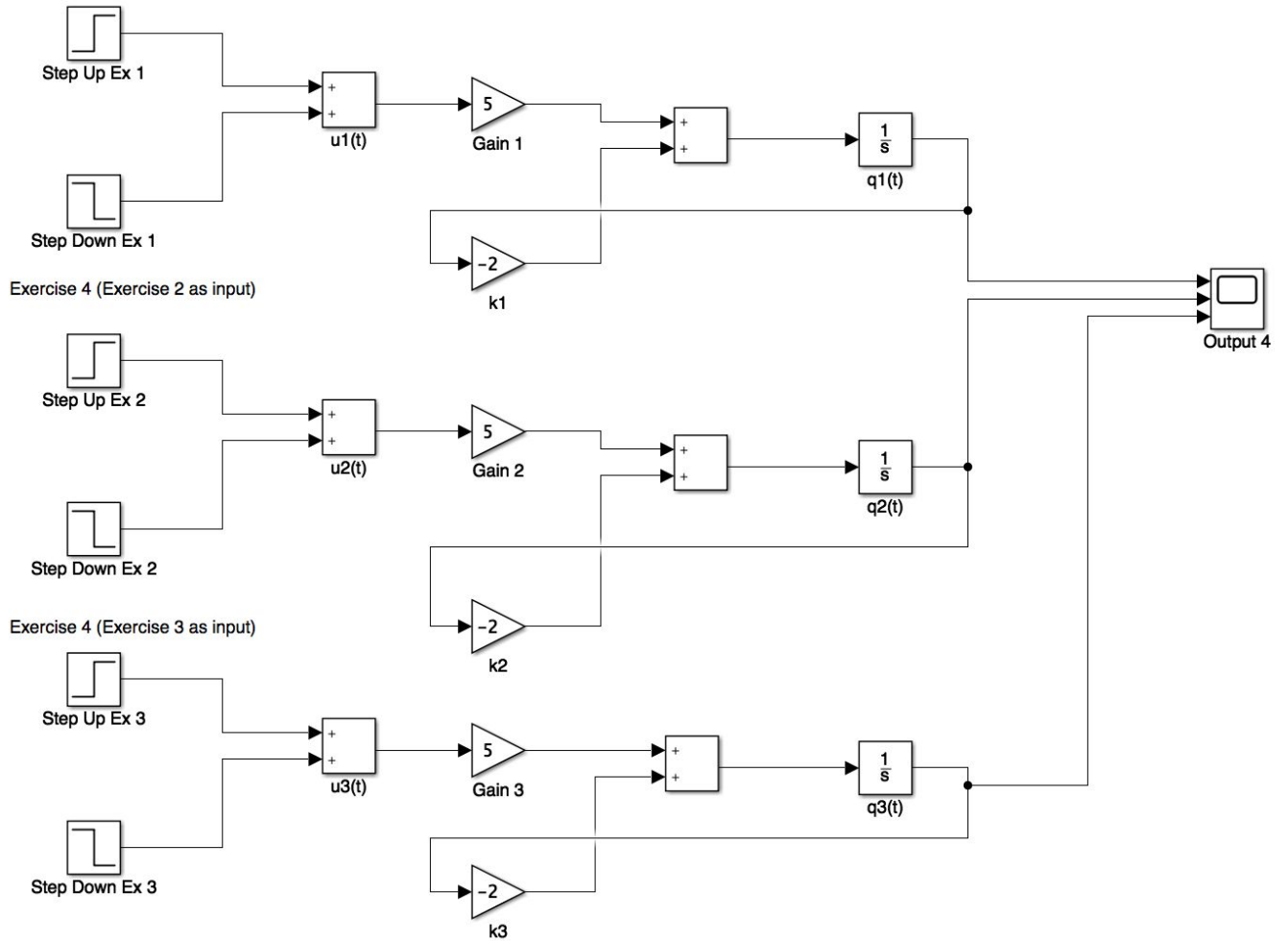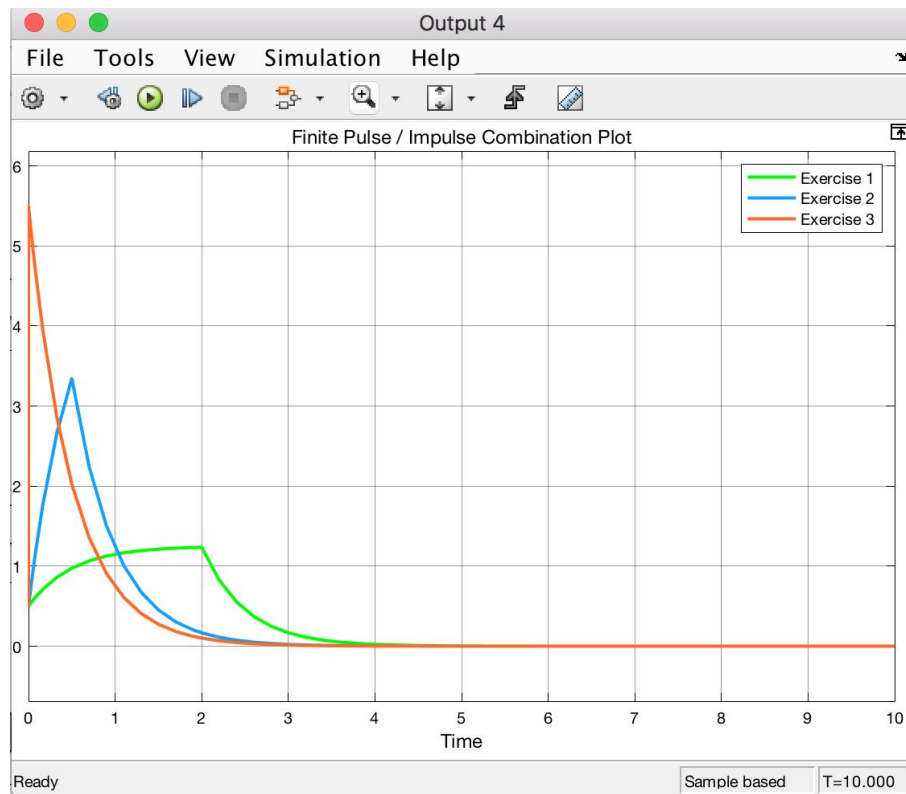
Simulink

Exercise 3

Plot

Exercise 4

Simulink

Exercise 4 (Exercise 1 as input)

Exercise 4 (Exercise 2 as input)

Exercise 4 (Exercise 3 as input)

Plot

Analysis

The plot from Exercise 1 has the lowest impulse height. The plot from Exercise 2 has the middle impulse height while the plot from Exercise 3 has the highest impulse height. As the width of the pulse becomes smaller and smaller, the peak of the impulse spike higher and the location of the spike happens earlier which is closer to t = 0. As Exercise 3 has the smallest width of the pulse, the peak of Exercise 3 is the highest and closest to t = 0.

If the width of the pulse is smaller, input is likely to be processed faster to reach the peak, and then stop and decrease over time. If the graph is analyzed as a drug dose example, Exercise 3 injects the drug dose into the body quickly and starts decreasing right after since it has the smallest width of the pulse. Exercise 2 injects the drug dose into the body slower than Exercise 3, but faster than Exercise 1. It is because the width of pulse for Exercise 2 is in the middle while the width of pulse for Exercise 1 is the longest among the three.
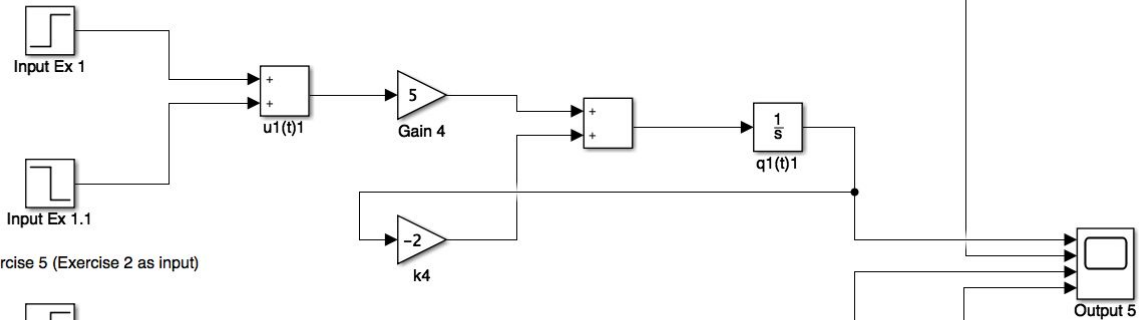
Exercise 5

Simulink

Exercise 5
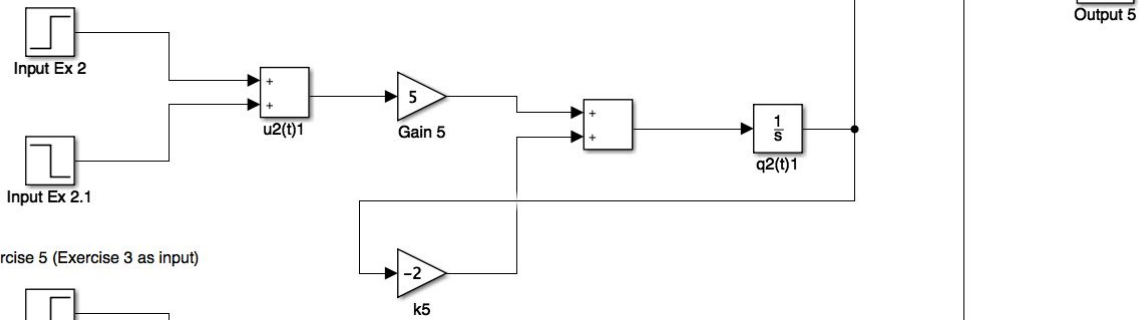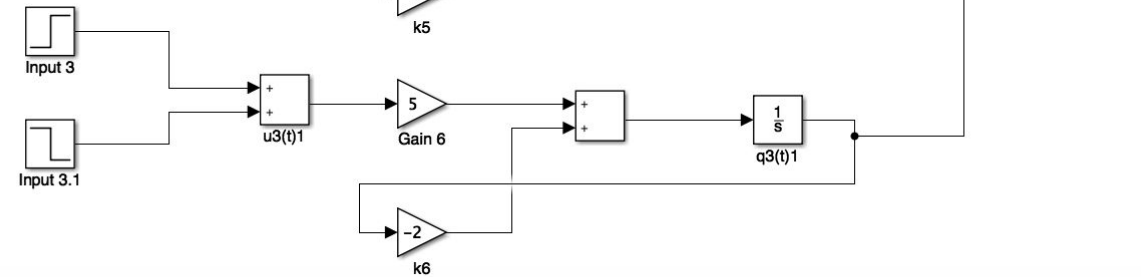

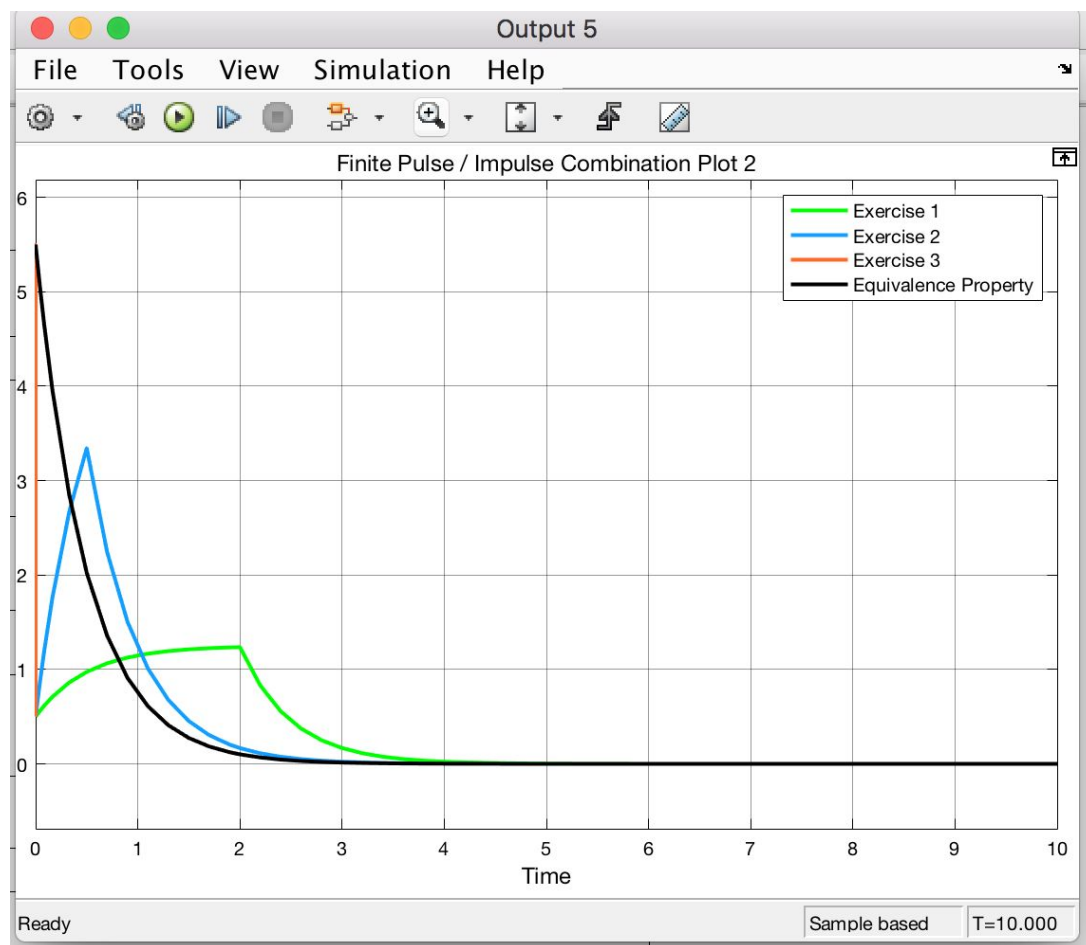Exercise 5 (Exercise 1 as input)

Exercise 5 (Exercise 2 as input)

Exercise 5 (Exercise 3 as input)

Plot

Analysis

The initial condition is 5.5