ECE355L Project 3
Part I: Convolution Calculations

Chase A. Lotito, *SIUC Undergraduate*

Exercise 1

Plot the respective graphs for the above examples and include in the report.

Solution.

All I did was copy the code from the lab manual, and after running those MATLAB scripts, I get the following plots:

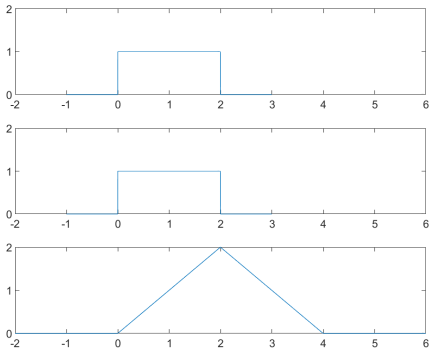

Figure 1: Example 1 Plot

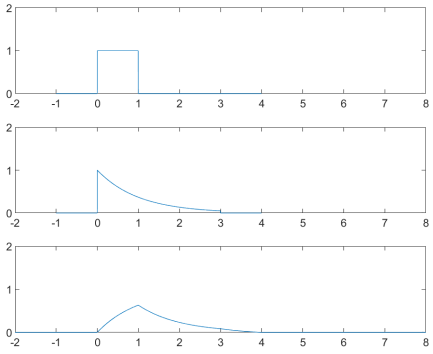

Figure 2: Example 2 Plot

Exercise 2

Plot the following signals on the same window, but separate graphs using the subplot command and axis so that all graphs have the same range for the time (as was done in the examples). Let $-2 \leq t \leq 25$ with a step size of 0.001 for $f(t)$ and $g(t)$. The convolution, $y(t)$, product will then be evaluated for $-4 \leq t \leq 50$.

$$f(t) = \sin\left(\frac{\pi}{10}t\right) \times [u(t) - u(t-20)]$$
$$g(t) = \cos\left(\frac{\pi}{5}t\right) \times [u(t) - u(t-15)]$$
$$y(t) = f(t) * g(t)$$

Solution.

To convolve f and g and then plot them with y, I wrote the following MATLAB code:

```
% Chase Lotito - ECE355L - Project 3
% PART 1: Plotting Convolutions
% Question 2

dt = 0.001;     % step size
t = -2:dt:25;   % f and g interval
t_y = -4:dt:50; % convolution interval

f = sin(t * pi / 10) .* rectpuls((t-10), 20);
g = cos(t * pi / 5) .* rectpuls((t-7.5), 15);
y = dt*conv(f, g);

% Plot all the convolutions
subplot(3,1,1), plot(t,f), title('f(t)'), axis([-2 25 -2 2]);
subplot(3,1,2), plot(t,g), title('g(t)'), axis([-2 25 -2 2]);
subplot(3,1,3), plot(t_y,y, 'r'), title('y(t) = f(t) * g(t)'), axis([-4
    50 -3 2]);
```

The output plot from the code is:

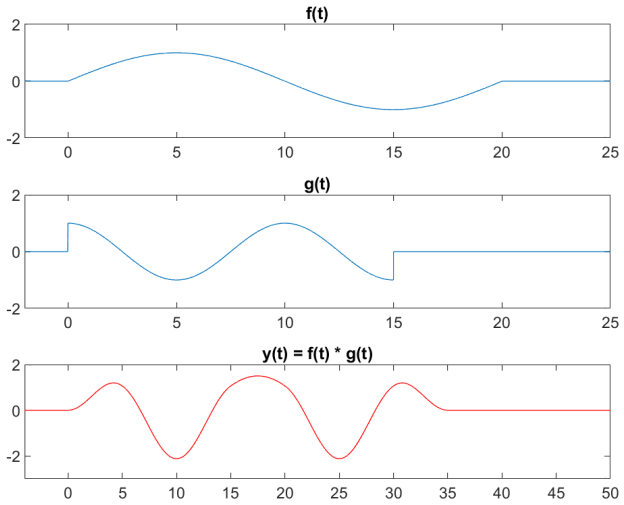

Figure 3: $f(t)$, $g(t)$, and $y(t)$