EECS 360
Lab 4: Discrete Convolution

1. Perform convolution for the following cases using the MATLAB function "conv". For each case, create a figure with 3 subplots: $x[n]$, $h[n]$, and $y[n] = x[n] \otimes h[n]$.

   Note: All the plots will be discrete (use stem) and time (n) is on the x-axis.

a)	$x[n] = 1$	$0 \le n \le 4$
	$h[n] = 1$	$-2 \le n \le 2$
b)	$x[n] = [0.5,\ 0.5,\ 0.5]$	$0 \le n \le 2$
	$h[n] = [3,\ 2,\ 1]$	$0 \le n \le 2$
c)	$x[n] = 5 - \lvert n \rvert$	$-5 \le n \le 5$
	$h[n] = 1$	$-5 \le n \le 5$
d)	$x[n] = 1$	$0 \le n \le 20$
	$h[n] = (1/2)^{n-1}$	$-10 \le n \le 10$
e)	$x[n] = 1 - 1.3e^{\left(\frac{n}{5}\right)}$	$-2 \le n \le 1$
	$h[n] = e^{(-0.7n)}$	$0 \le n \le 4$

2. Write the general summation formula to perform discrete convolution of $y[n] = x[n] \otimes h[n]$

   Compute $y[0]$ by substituting $n = 0$ in the above expression and expand the summation series. Explain how you would compute $y[0]$ graphically by looking at this result.

3. Convolve the signals given in part 1 **a** through **c** by hand. Compare the results with the ones obtained by using the conv function.