EE 110B - Signals and Systems
Spring 2017
Lab 1

Task 1:

Use MATLAB to plot the following sequences from $n = 0$ to $n = 50$, discuss and explain their patterns:

1) $x[n] = \cos\left(\frac{\pi}{2} n\right)$
2) $x[n] = \cos\left(\frac{5\pi}{2} n\right)$
3) $x[n] = \cos(\pi n)$
4) $x[n] = \cos(0.2n)$
5) $x[n] = 0.9^n \cos\left(\frac{\pi}{5} n\right)$
6) $x[n] = 1.1^n \cos\left(\frac{\pi}{5} n\right)$
7) $x[n] = \cos\left(\frac{\pi}{5} n\right)\cos\left(\frac{\pi}{25} n\right)$
8) $x[n] = \cos\left(\frac{\pi}{100} n^2\right)$
9) $x[n] = \cos^2\left(\frac{\pi}{5} n\right)$

Task 2:

Use MATLAB to generate and **plot** a random sequence $x[n]$, $0 \le n \le 50$. For this purpose you can use either `rand` or `randn` command. **Compute, plot and discuss** the following operations:

1) $x_e[n] = \frac{x[n] + x[-n+50]}{2}$ and $x_0[n] = \frac{x[n] - x[-n+50]}{2}$ for $0 \le n \le 50$.
   Explain why these are called the even and odd components of the signal $x[n]$.

2) $x[2n]$ for $0 \le n \le 25$.

3) $x[5n]$ for $0 \le n \le 10$.

4) $\sum_{m=0}^{4} x[n-m]$ for $4 \le n \le 50$.

5) $x[n] * x[-n] = \sum_{m=-\infty}^{+\infty} x[m]x[m-n]$ for $-50 \le n \le 50$ where $x[n] = 0$ for $n < 0$ or $n > 50$