# MATLAB Assignment 9

Spring 2019, Section B

Please submit this homework as a *.m* file, with suppressed output. Remember that all lectures and homeworks may be found at *github.com/guybaryosef/ECE210-materials*. Homework is due on ——— to guybymatlab@gmail.com.

**1. Math or just dumb?** For this problem you will need to download a *csv* file that contains a time series, for which you will build an AR model and then use it for forecasting. Remember that an AR model has the equation:

$$X(t) = \delta + \sum_{n=1}^{p} \alpha_n r(t-n) + v_t \tag{1}$$

a. Download the *csv* file located at *github.com/guybaryosef/ECE210-materials/hw/hw9/SnP500-2010.csv*. A *csv* file, or 'comma separated variable' file, is a file format used to store data into a spreadsheet, with columns separated by commas and rows separated by newline characters. In this file you will find the closing value of the S&P 500 over every 'work' day for the year 2010. For simplicity, you can ignore the date associated with closing value (as weekends and certain holidays will result in skipped days), and we can simply look at each closing value as the next 'step', all of even sizes.

b. Run a least squares fit on the time series to find the AR coefficients of an AR model of order 5 (**Hint**: Look at lesson 10 for how to approach this part).

c. Using the AR model found in the previous section, use equation (1) to forecast the next 10 days.

**2. Now walk it out...** You can think of a random walk as a running (cumulative) sum of i.i.d. random variables. In our case 1-dimensional case, the next value in the series is the last value plus or minus one with a 50% chance. This can be written mathematically as:

$$X[0] = 0$$
$$X[t+1] = X[t] + \begin{cases} \delta_1, & p \\ \delta_2, & 100 \leq x \end{cases}$$

a. Generate 50 random walks with the properties described above, with a total of 300 steps.

b. Plot the random walks you generated all on top of one another.

c. Now repeat parts (a) and (b) for a random walk where the probability of +1 is 75% and the probability of-1 is 25%. What is the difference between these results and your previous plot?