Assignment

In this assignment you will implement and compare three polynomial functions (line - degree $d = 1$, quadratic - degree $d = 2$ and cubic - degree $d = 3$) for predicting next week labels based on the previous W weekly closing prices. Recall that a weekly closing price for week i is the (adjusted) closing price P_i for the last trading day day of that week.

Assume that you are given W and you have weekly closing prices $P_1, \ldots, P_W$ for weeks $1, \ldots, W$. You want to predict a label ("red" or "green") for week $W + 1$ using a polynomial model of degree d fitted on prices $P_1, \ldots, P_W$.

You proceed as follows. Construct a polynomial model of degree d to fit $P_1, \ldots, P_W$ and use this model to predict price P_{W+1}^* for week $W + 1$. Then assign a label to week $W + 1$ based on the following three cases:

1. $P_{W+1}^* > P_W$: week $W + 1$ ia assigned a "green" color (you predict next week closing price is higher than current, and therefore, you want to be invested)

2. $P_{W+1}^* < P_W$: week $W + 1$ ia assigned a "red" color (you predict next week closing price to be lower than the current price, and therefore, you want to remain in cash)

3. $P_{W+1}^* = P_W$: week $W + 1$ ia assigned the same color as week W

Questions:

1. take weekly data for year 1. For each $W = 5, 6, \ldots, 12$ and for each $d = 1, 2, 3$ construct the corresponding polynomials Use these polynomials to predict weekly labels. Plot the accuracy - on x axis you have W and you plot three curves for accuracy (separate curve for each d)

2. for each d take the best W that gives you the highest accuracy. Use this W to predict labels for year 2. What is your accuracy?

3. compute confusion matrices (for each d) for year 2

4. implement three trading strategies for year 2 (for each d using the "best" values for W from year 1 that you have computed)