EECE 5612 HW9
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For part 1 we use the first 24 values to predict the next 12 given that the model of the stock price over time is

$$\hat{y}[n] = a_0 + a_1 n + \Delta Y[n], \qquad \Delta\hat{Y}[n] = a * \Delta Y[n-1] + Z[n]$$

First, we find a_0 and a_1 by applying least squares fitting using the equations

$$a_1 = \frac{S_{xy} - \frac{1}{N} S_x S_y}{S_{xx} - \frac{1}{N} S_x^2}, \qquad b = \frac{1}{N}\left(S_y - a S_x\right),$$

$$S_{xy} = \sum_{i=1}^{N} x_i y_i,\ S_{xx} = \sum_{i=1}^{N} x_i^2, S_x = \sum_{i=1}^{N} x_i, S_y = \sum_{i=1}^{N} y_i$$

And find that $a_0 = 0.97$ and $a_1 = 0.24$. Then we model ΔY as AR-1 and find a using

$$a = \boldsymbol{R^{-1}} * \boldsymbol{r} = 0.646$$

For part 2, the values are modeled as

$$\hat{y}[n+1] = c[n] y[n]$$

where c is found by using an adaptive LMS trained from 1 to 24, and used to predict 25 to 36. The µ size is calculated to be smaller than

$$\frac{2}{tr[\boldsymbol{R}]} = .1$$

Where .01 was found to be a small enough value for convergence. The c value from training was found to be $c = 1.036$. The following plot shows the truth values and the two prediction models prediction model for n in [24, 36]