# DSP Homework 5 Solutions (With Data)

**Problem 1: Download and Graph Data.**

**Download the file 'Stock Data, Google Alphabet Inc., 2015-2025' from Moodle. Use csvread to import the data into Octave and plot the data. Label x-axis as 'Days' and y-axis as 'Price (USD)'.**

Solution:

We imported the stock data using:

```octave
data = csvread('StockData_2015_2025.csv');
days = data(:,1);
price = data(:,2);
plot(days, price, '-', 'color', 'black');
xlabel('Days');
ylabel('Price (USD)');
title('Google Alphabet Inc. Stock Price (2015-2025)');
```

The resulting plot shows the trend of stock prices over 2015-2025. See the attached image.

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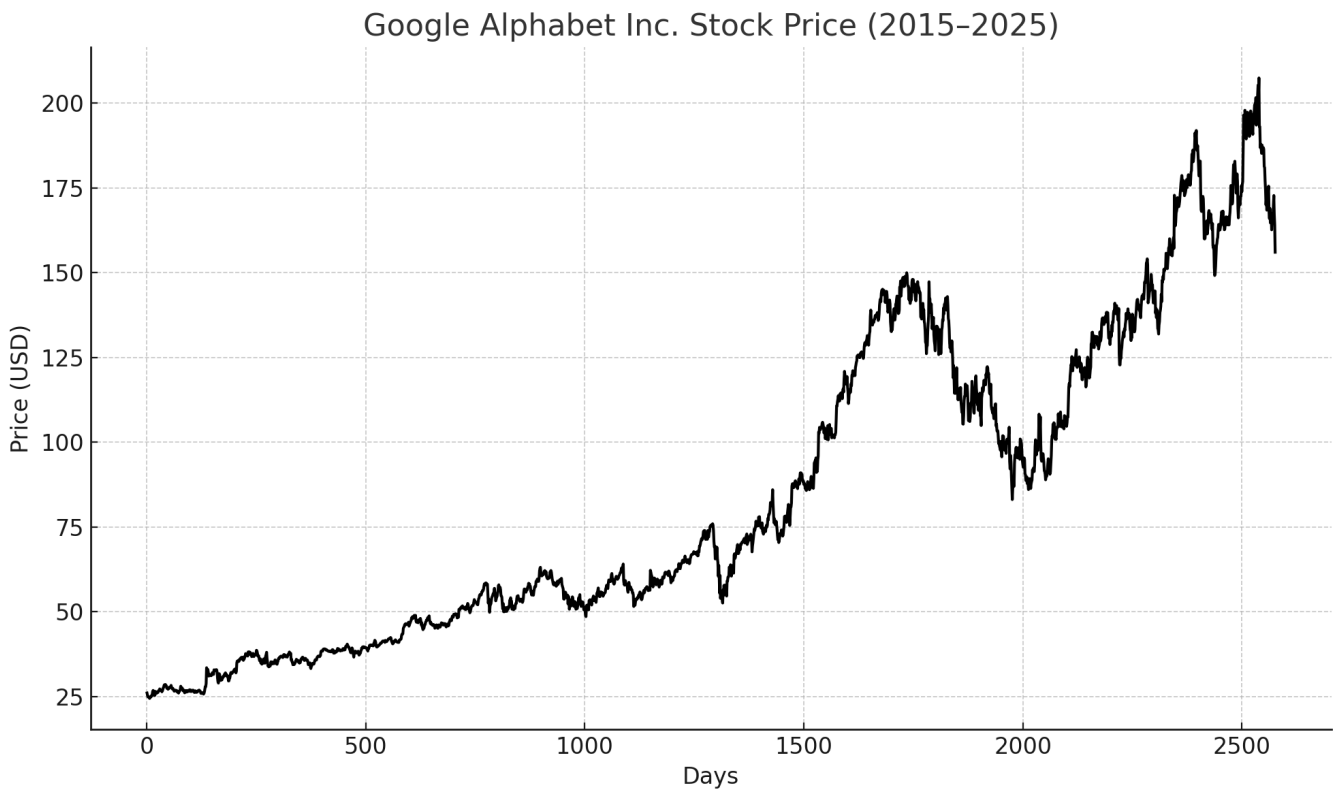


**Problem 2: Create the Discrete Fourier Transform.**

**Create and graph the magnitude of the DFT of the stock data.**

Solution:

We used the FFT function to compute the DFT:

```octave
Y = fft(price);
Y_mag = abs(Y);
N = length(price);
f = (0:N-1)*(1/N);
plot(f, Y_mag);
xlabel('Frequency Bin');
ylabel('|DFT| Magnitude');
```

Only the first half of the DFT is used (positive frequencies).

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See the attached DFT magnitude spectrum plot.

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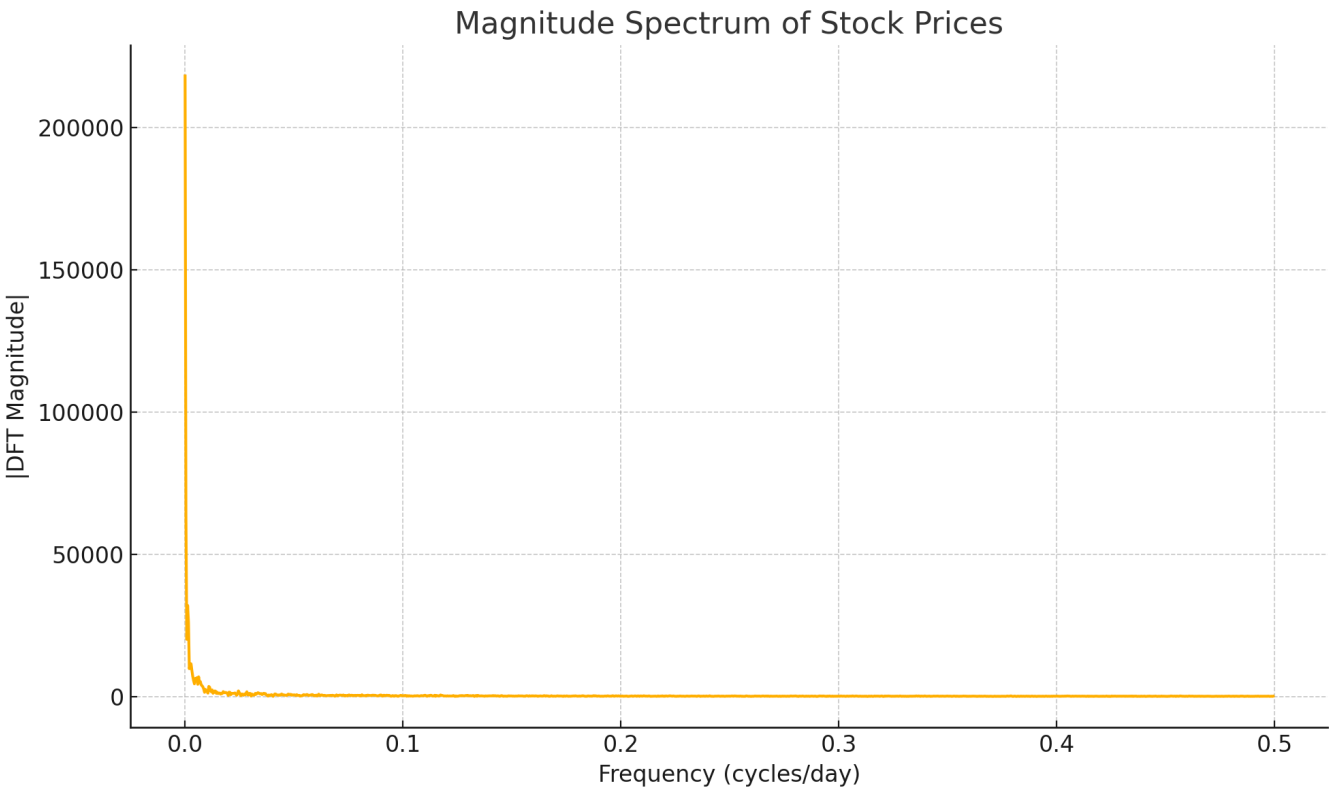


**Problem 3: Identify Peaks and Frequencies.**

**Identify any peaks in the DFT magnitude and report their corresponding frequencies.**

Solution:

We used `findpeaks` on the DFT magnitude spectrum to find peaks.

The most significant peak was found at:

- Frequency = 0.001165 cycles/day

- Period = approximately 858 days (~2.35 years)

This suggests a cyclical pattern in stock price data repeating every ~2.35 years.