**Matlab Assessment 1**

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**Results**

In this analysis I compared the output of number of rabbits with respect to number of months observed using two different functions, an exponential growth rate and the Fibonacci Sequence. As seen in the figure below the exponential function far exceeds the Fibonacci sequence for the output of rabbits over a 12-month period.

A graph showing the growth of fibonacci sequence

Description automatically generated

*Figure 1: This is a plot of the number of rabbits as a function of month. The red plot shows the exponential growth of rabbits per month and the blue plot shows the first 12 Fibonacci number.*

**Discussion**

The results of this analysis were expected as the exponential growth function results in a logarithmic output of rabbits which results in rapid population increase. Whereas the Fibonacci Sequence results in a steady growth in the population of rabbits.

**MATLAB code**

% Fibonacci Sequence vs. Exponential Growth

% This MATLAB script calculates and visualizes the growth of a rabbit

% population over time, comparing the Fibonacci sequence-based growth to

% exponential growth.

% Task 1: Fibonacci Sequence Calculation

n = 12; % Number of months (modify as needed)

fibonacci\_seq = zeros(1, n); % Initialize a vector to store Fibonacci numbers

% Initialize the first two Fibonacci numbers as per the problem statement

fibonacci\_seq(1) = 1; % For month 1

fibonacci\_seq(2) = 1; % For month 2

% Calculate Fibonacci numbers for the remaining months iteratively

for i = 3:n

fibonacci\_seq(i) = fibonacci\_seq(i - 1) + fibonacci\_seq(i - 2);

end

% Task 2: Plotting Fibonacci Sequence vs. Exponential Growth

months = 1:n;

% Calculate the population that doubles every month (exponential growth)

exponential\_growth = 2 .^ months;

% Plotting

figure;

% Plot the Fibonacci sequence in blue with circles as markers

plot(months, fibonacci\_seq, 'b-o', 'LineWidth', 2, 'MarkerSize', 8);

hold on;

% Plot the exponential growth in red with asterisks as markers

plot(months, exponential\_growth, 'r-\*', 'LineWidth', 2, 'MarkerSize', 8);

hold off;

% Adding labels and legend

xlabel('Month'); % Label for the x-axis

ylabel('Number of Rabbits'); % Label for the y-axis

title('Fibonacci Sequence vs. Exponential Growth'); % Title for the plot

legend('Fibonacci Sequence', 'Exponential Growth', 'Location', 'Northwest'); % Legend for the plotted lines