DIGITAL SIGNAL PROCESSING

TASK 1

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Submitted to:

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Task 1:

The task was done to create an exercise using the MATLAB commands Logarithm of base 10, Cosine, ceil, and create a custom function.

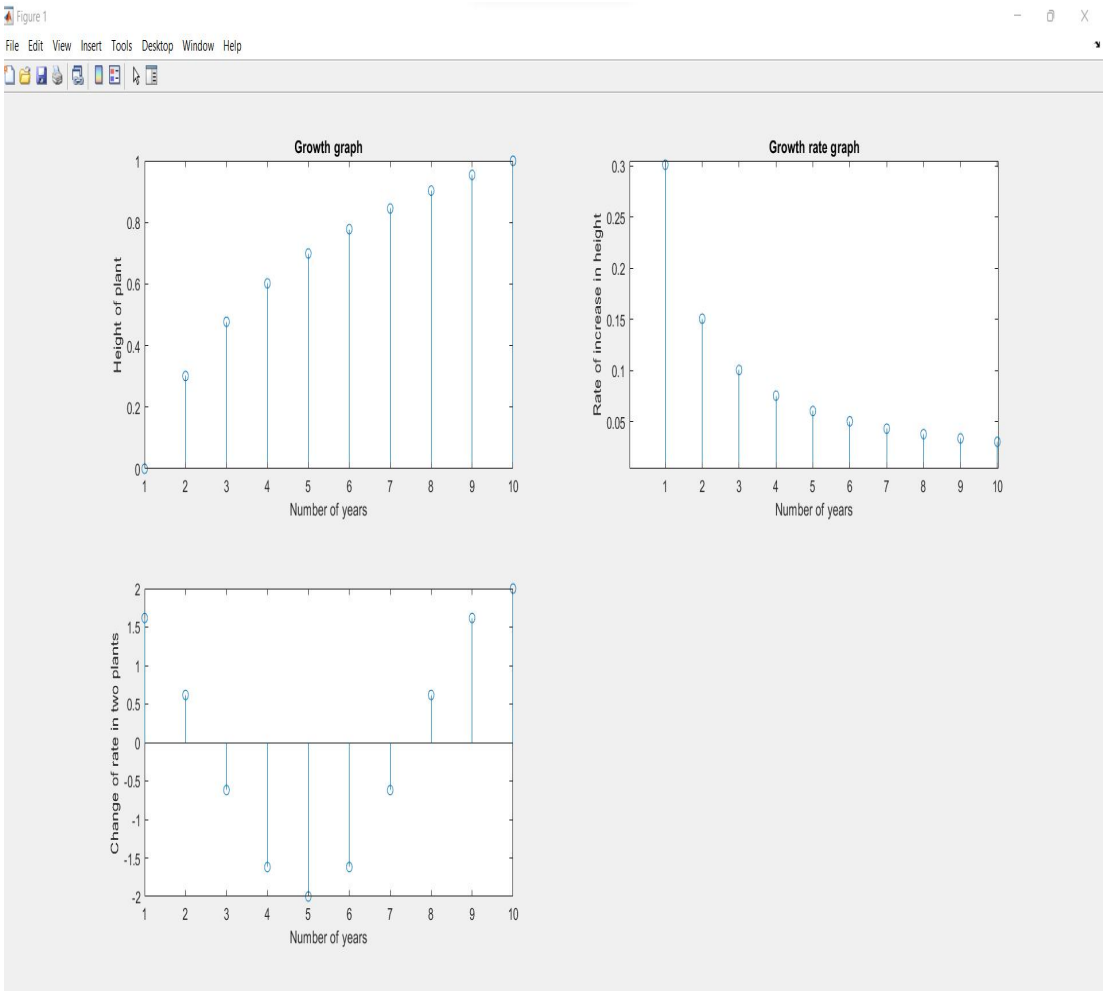
Questions:

In my free time, I like planting trees in my garden. I brought two mango seeds and decided to plant it in two different ways. One by using fertilizers and one without using fertilizers. After six months, there was a huge difference in the height between both trees.

1. Consider the initial starting height of 1 cm.
2. Describe the growth of the plant as a logarithmic function(log base 10) with respect to time and sketch the graph for time period of 10 years with interval of a year.
3. Calculate the rate of increase in height per year of the plant and plot it.(rate is calculated by subtracting the initial value by the following value divided by the time.)
4. Calculate the average rate of increase in height. Use the ceiling value.
5. The rate if increase in height is observed in different seasons for both trees starting from summer and found to be a cosine function. If initial rate of change was 2 cm/year, sketch the graph.

Sample Code:

```
clc;clear;
n = 1 : 1 : 10; %number of years
N = 10; %number of elements
g = log10(n); %logarithmic function
rt = rate(g(:,1), g(:,2),n); % function call
R = 2 * cos(pi*2 * n/N); %cosine function
a = ceil(average(rt)); %function call

subplot(2, 2, 1), stem(n, g); hold on %plotting
xlabel("Number of years");
ylabel("Height of plant");
title("Growth graph");

subplot(2, 2, 2), stem(n, rt); hold on
xlabel("Number of years");
ylabel("Rate of increase in height");
title("Growth rate graph");

subplot(2,2,3), stem(n, R); hold on
xlabel("Number of years");
ylabel("Change of rate in two plants");

function [av] = average(s) %creating function
l = length(s); %total number of elements
av = sum(s) / l; %mean calculation
end

function r = rate(a,b,n)
    r = [];
    for i = 1 : length(n)
       r = [ r (b - a) / n(i) ];
    end
end
```



The graph from the sample solution.

Reference:

Linear and exponential growth models. Table Growth of a plant population. | Math Lounge (mathelounge.de)