

Digital Signal Processing

Assignment 1

Name: Aman Kumar

Reg no. : ECE/22118/972

Problem 1 and 2 both solutions are in the same code :

Program

```
x1_samples = input('Enter the samples of x1[n]: ');
x1_zero_index = input('Enter the position of n=0 for x1[n] (index): ');
x2_samples = input('Enter the samples of x2[n]: ');
x2_zero_index = input('Enter the position of n=0 for x2[n] (index): ');
x1_n_values = (1:length(x1_samples)) - x1_zero_index;
x2_n_values = (1:length(x2_samples)) - x2_zero_index;
common_n_range = min(min(x1_n_values), min(x2_n_values)) :
max(max(x1_n_values), max(x2_n_values));
x1_aligned = zeros(1, length(common_n_range));
x2_aligned = zeros(1, length(common_n_range));
x1_aligned(ismember(common_n_range, x1_n_values)) = x1_samples;
x2_aligned(ismember(common_n_range, x2_n_values)) = x2_samples;
figure;
subplot(3, 2, 1);
stem(x1_n_values, x1_samples, 'r', 'LineWidth', 1.5); grid on;
xlabel('n'); ylabel('x1[n]');
title('Sequence x1[n]');
subplot(3, 2, 2);
stem(x2_n_values, x2_samples, 'b', 'LineWidth', 1.5); grid on;
xlabel('n'); ylabel('x2[n]');
title('Sequence x2[n]');
% Operations
sum_sequence = x1_aligned + x2_aligned;
difference_sequence = x1_aligned - x2_aligned;
product_sequence = x1_aligned .* x2_aligned;
% Plot sum_sequence[n]
subplot(3, 2, 3);
stem(common_n_range, sum_sequence, 'm', 'LineWidth', 1.5); grid on;
xlabel('n'); ylabel('Sum');
```

```

title('Sum: x1[n] + x2[n]');
% Plot difference_sequence[n]
subplot(3, 2, 4);
stem(common_n_range, difference_sequence, 'g', 'LineWidth', 1.5); grid on;
xlabel('n'); ylabel('Difference');
title('Difference: x1[n] - x2[n]');
% Plot product_sequence[n]
subplot(3, 2, 5);
stem(common_n_range, product_sequence, 'k', 'LineWidth', 1.5); grid on;
xlabel('n'); ylabel('Product');
title('Product: x1[n] .* x2[n]');

```

Plots

Below are plot with $x1 = [1, 2, 3, 4]$, zero at = 2nd position
 $x2 = [5, 6]$, zero at = 1st position

