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ECE – III YEAR

MATLAB Problem

1. Sin Function

2. Step function

3. Ramp function

4. Exponential (growing and decaying)

5. Impulse function

Solution:

Code:

```
clc; clear; close all;

%% Time definitions
t = -5:0.01:5;   % Continuous time
n = -5:1:5;      % Discrete time

%% 1. Sine Function
f = 1; % Frequency (Hz)
sin_t = sin(2*pi*f*t);
sin_n = sin(2*pi*f*n);

figure;
subplot(2,1,1);
plot(t, sin_t, 'b', 'LineWidth', 1.5);
title('Continuous Sine Function'); xlabel('t'); ylabel('sin(2\pi f t)');
grid on;

subplot(2,1,2);
```

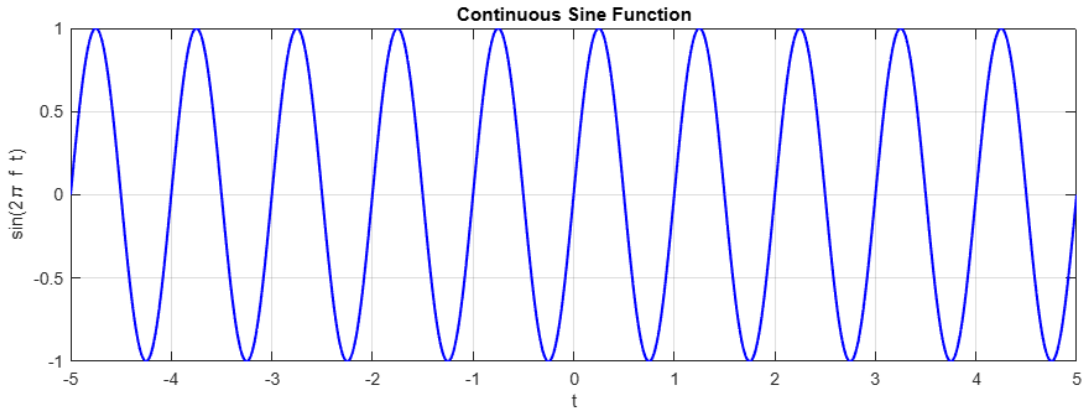
```
stem(n, sin_n, 'r', 'filled');
title('Discrete Sine Function'); xlabel('n'); ylabel('sin(2\pi f n)');
grid on;

%% 2. Step Function
step_t = t >= 0;
step_n = n >= 0;

figure;
subplot(2,1,1);
plot(t, step_t, 'b', 'LineWidth', 1.5);
title('Continuous Step Function'); xlabel('t'); ylabel('u(t)');
grid on;

subplot(2,1,2);
stem(n, step_n, 'r', 'filled');
title('Discrete Step Function'); xlabel('n'); ylabel('u[n]');
grid on;
%% 3. Ramp Function
ramp_t = t .* (t >= 0);
ramp_n = n .* (n >= 0);

figure;
subplot(2,1,1);
plot(t, ramp_t, 'b', 'LineWidth', 1.5);
title('Continuous Ramp Function'); xlabel('t'); ylabel('t u(t)');
grid on;

subplot(2,1,2);
```

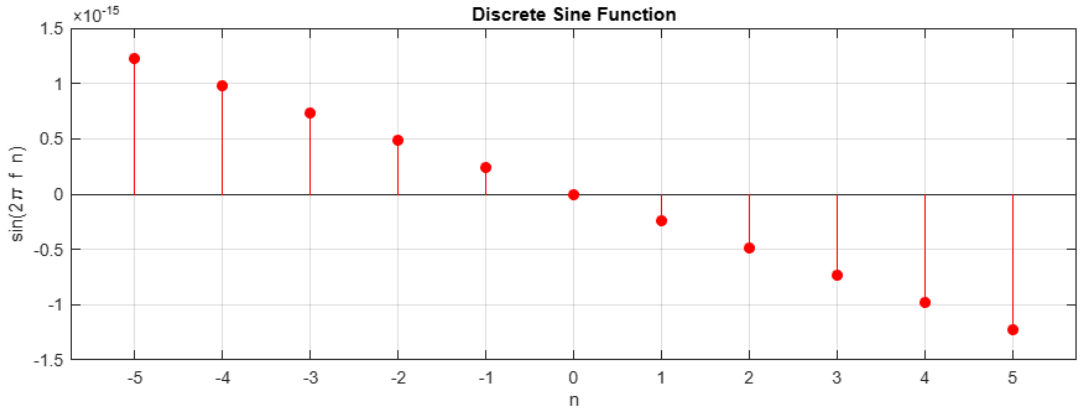
```
stem(n, ramp_n, 'r', 'filled');
title('Discrete Ramp Function'); xlabel('n'); ylabel('n u[n]');
grid on;
%% 4. Exponentional Function
exp_grow_t = exp(0.5*t);
exp_decay_t = exp(-0.5*t);
exp_grow_n = exp(0.5*n);
exp_decay_n = exp(-0.5*n);

figure;
subplot(2,2,1);
plot(t, exp_grow_t, 'b', 'LineWidth', 1.5);
title('Continuous Growing Exponential'); xlabel('t'); ylabel('e^{0.5t}');
grid on;

subplot(2,2,2);
plot(t, exp_decay_t, 'r', 'LineWidth', 1.5);
title('Continuous Decaying Exponential'); xlabel('t'); ylabel('e^{-0.5t}');
grid on;

subplot(2,2,3);
stem(n, exp_grow_n, 'b', 'filled');
title('Discrete Growing Exponential'); xlabel('n'); ylabel('e^{0.5n}');
grid on;

subplot(2,2,4);
stem(n, exp_decay_n, 'r', 'filled');
title('Discrete Decaying Exponential'); xlabel('n'); ylabel('e^{-0.5n}');
grid on;
```

```
%% 5.Impulse Function
impulse_t = (t == 0);
impulse_n = (n == 0);

figure;
subplot(2,1,1);
plot(t, impulse_t, 'b', 'LineWidth', 1.5);
title('Continuous Impulse Function (Ideal)'); xlabel('t'); ylabel('\delta(t)');
grid on;

subplot(2,1,2);
stem(n, impulse_n, 'r', 'filled');
title('Discrete Impulse Function'); xlabel('n'); ylabel('\delta[n]');
grid on;
```

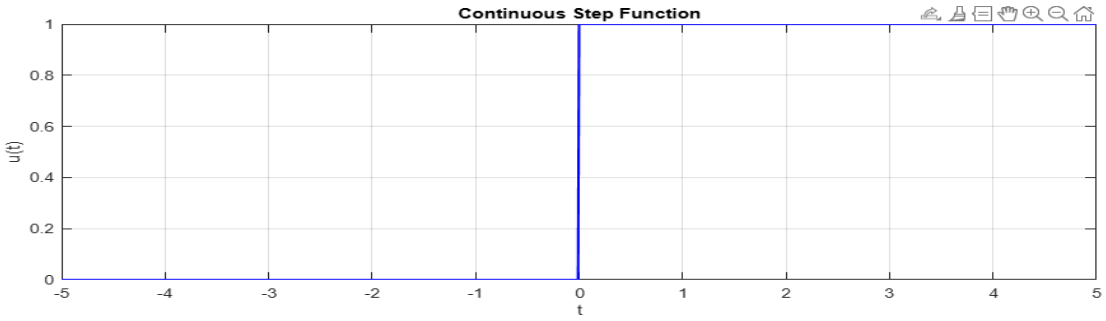
Graph

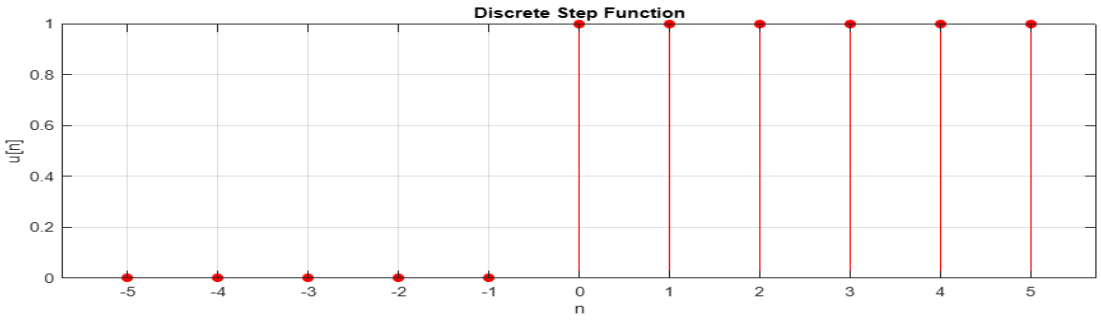
Sin Function



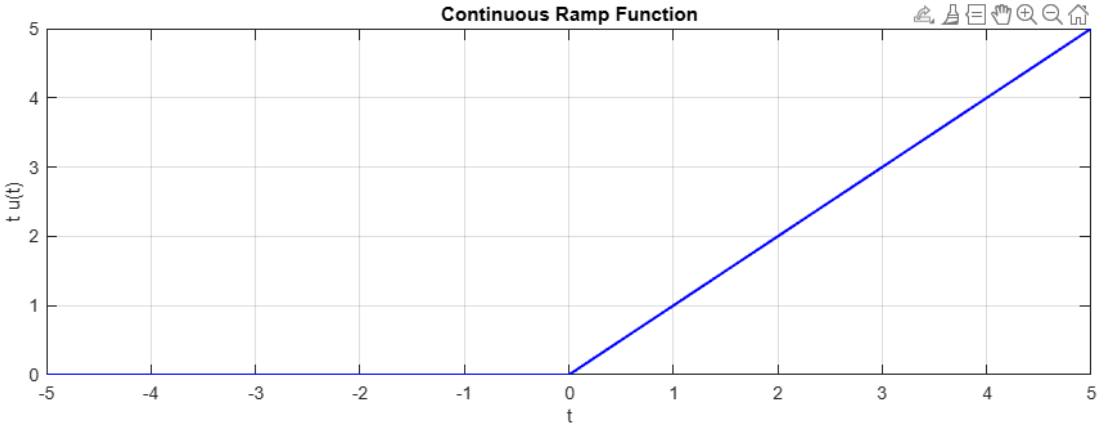


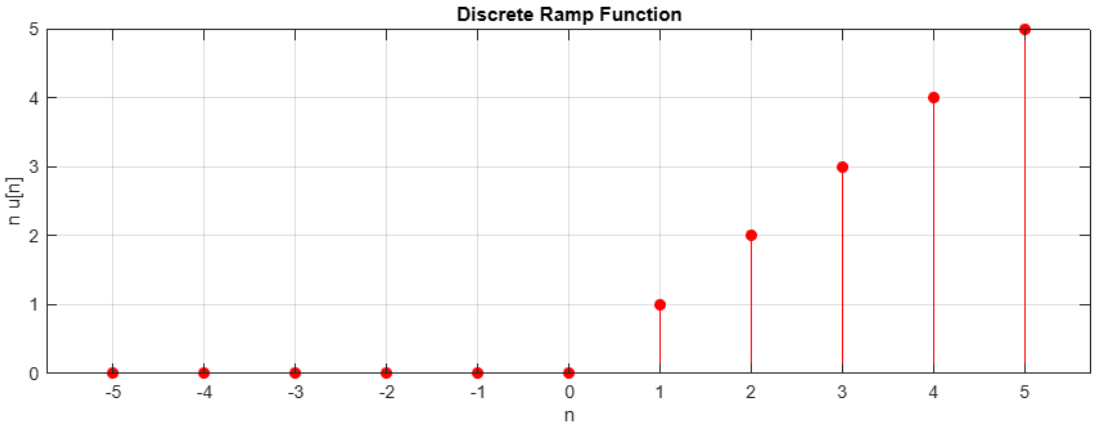
Step Function



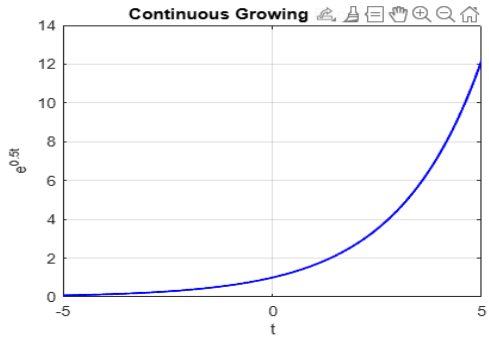


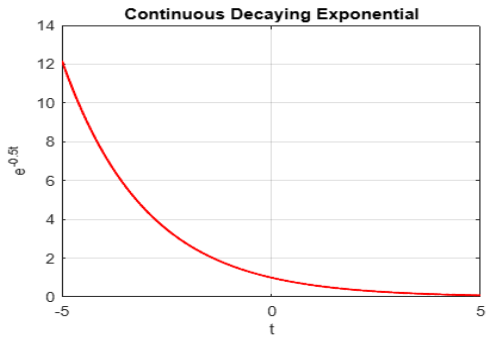
Ramp Function

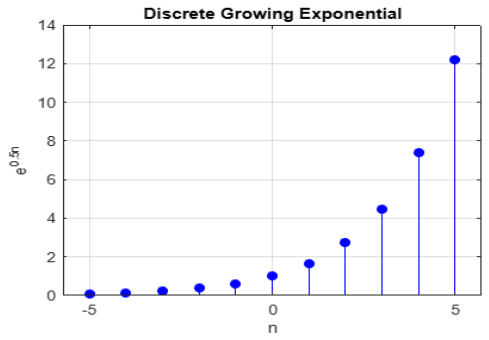


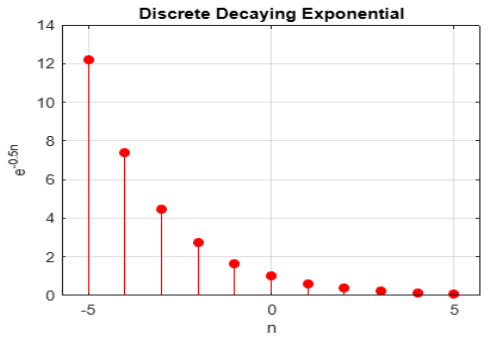


Exponential









Impulse Function