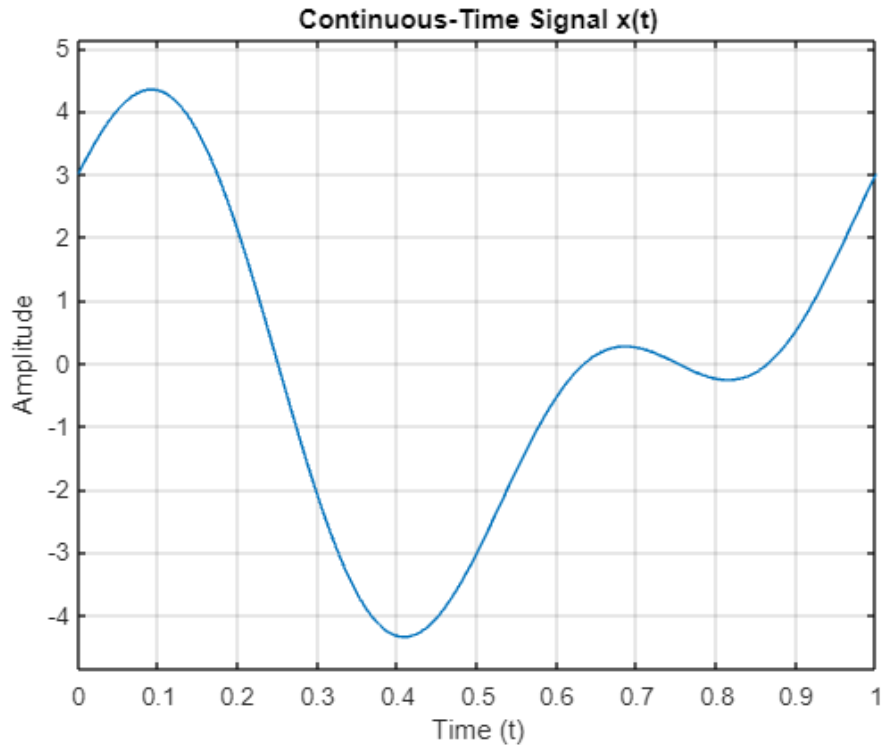
Problem 1: Continuous-Time Signals and Systems

```
% Define the continuous-time signal
t = linspace(0, 1, 1000);  % One period from 0 to 1
x_t = 3*cos(2*pi*t) + 2*sin(4*pi*t);

% Plot the waveform of x(t) over one period
figure;
plot(t, x_t);
xlabel('Time (t)');
ylabel('Amplitude');
title('Continuous-Time Signal x(t)');
grid on;

% Determine the frequency components present in x(t)
frequency_component_1 = 1 / (2*pi);  % Frequency of the first term
frequency_component_2 = 1 / (4*pi);  % Frequency of the second term
fprintf('Frequency component 1: %.2f Hz\n', frequency_component_1);
fprintf('Frequency component 2: %.2f Hz\n', frequency_component_2);

% Compute the average power of x(t) over one period
T = 1 / (4*pi);  % Period of the signal
average_power = (1/T) * trapz(t, abs(x_t).^2);  % Numerical integration
fprintf('Average power of x(t) over one period: %.2f\n', average_power);
```




```
Frequency component 1: 0.16 Hz
Frequency component 2: 0.08 Hz
Average power of x(t) over one period: 81.68
```

Problem 2: Discrete-Time Signals and Systems

```
% Define the discrete-time signal
x_n = [1, -2, 3, -4, 5];

% Determine the length of the signal
signal_length = length(x_n);
fprintf('Length of the signal: %d\n', signal_length);

% Find the value of x[3]
x_3 = x_n(3);
fprintf('Value of x[3]: %d\n', x_3);

% Compute the sum of all elements in the signal
sum_elements = sum(x_n);
fprintf('Sum of all elements in the signal: %d\n', sum_elements);

% Calculate the energy of the signal
energy = sum(abs(x_n).^2);
fprintf('Energy of the signal: %d\n', energy);
```

```
Length of the signal: 5


Value of x[3]: 3


Sum of all elements in the signal: 3


Energy of the signal: 55
```