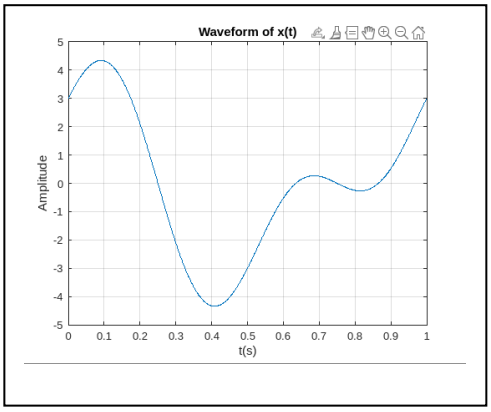
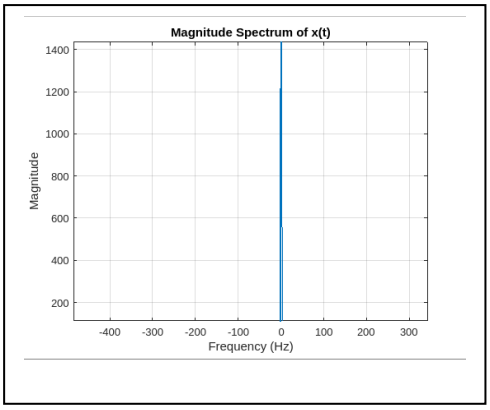
```
>> % PROBLEM 1
>> % Define the signal
>> t = linspace(0,1,1000); % 1000 pts for 1 second
>> x = 3*cos(2*pi*t) + 2*sin(4*pi*t);

>> % 1- Ploy the waveform of x(t) over one period
>> figure;
>> plot(t,x);
>> xlabel('t(s)');
>> ylabel('Amplitude');
>> title('Waveform of x(t)');
>> grid on;
```




```
>> % 2- Determine the frequency components present in x(t)
>> fourirerTransform = fft(x);
>> Fs = 1 / (t(2) - t(1)); % sampling freq.
>> f = linspace(-Fs/2,Fs/2, length(t));
>> % Plot the magnitude spectrum
figure;
plot(f, abs(fftshift(fourirerTransform)));
xlabel('Frequency (Hz)');
ylabel('Magnitude');
title('Magnitude Spectrum of x(t)');
grid on;
>> % 3- Compute the average power of x(t) over one period
>> T = 1; % period
>> average_power = 1 / T * trapz(t, abs(x).^2);
>> disp(['Average power: ', num2str(average_power)]);
Output: Average power: 6.5
```



```
>> % PROBLEM 2

>> % Define the signal

x = [1, -2, 3, -4, 5];


>> % 1- Determine the length of the signal

signal_length = length(x);

disp(['Length of the signal: ', num2str(signal_length)]);

Output: Length of the signal: 5


>> % 2- Find the value of x[3]

x_3 = x(3);

disp(['Value of x[3]: ', num2str(x_3)]);

Output: Value of x[3]: 3


>> % 3- Compute the sum of all elements in the signal

sum_of_elements = sum(x);

disp(['Sum of all elements in the signal: ', num2str(sum_of_elements)]);

Output: Sum of all elements in the signal: 3


>> % 4- Compute the energy of the signal

energy = sum(x.^2);

disp(['Energy of the signal: ', num2str(energy)]);

Output: Energy of the signal: 55
```