Consider a continuous - time signal x(t)=3cos(2πt) + 2sin(4πt)

1)Sketch the waveform of x(t) over one period

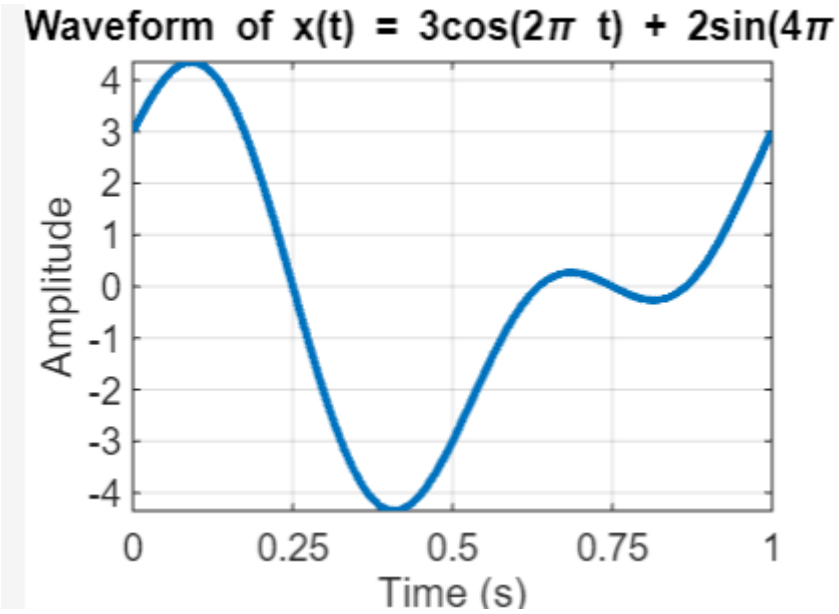
```
>> % Define the time vector
t = linspace(0, 1, 1000); % Assuming one period is from 0 to 1

% Define the signal
x = 3*cos(2*pi*t) + 2*sin(4*pi*t);

% Plot the signal
figure;
plot(t, x, 'LineWidth', 2);
title('Waveform of x(t) = 3cos(2\pi t) + 2sin(4\pi t)');
xlabel('Time (s)');
ylabel('Amplitude');
grid on;

% Display gridlines at integer multiples of the period
xticks(0:0.25:1);
yticks(-5:1:5);

% Show the plot
axis tight;
```



2)Determine the frequency components present in x(t)

```
>> %Define the symbolic variable t
 syms t
 %Define the continuous-time signal x(t)
 x_t = 3*cos(2*pi*t) + 2*sin(4*pi*t);
 %Compute the Fourier transform of x(t)
 X_f = fourier(x_t);
 %Display the frequency components
 disp('Frequency components present in x(t):');
 disp(X_f)
Frequency components present in x(t):
3*pi*(dirac(w - 2*pi) + dirac(w + 2*pi)) - pi*(dirac(w - 4*pi) - dirac(w + 4*pi))*2i
```

3)Compute the average power of x(t) over one period.

```
>> % Define the symbolic variable t
syms t real

% Define the continuous-time signal x(t)
x_t = 3*cos(2*pi*t) + 2*sin(4*pi*t);

% Compute the average power over one period
T = 1; % Period of the signal
P_avg = (1/T) * int(abs(x_t)^2, t, 0, T);

% Display the average power
disp('Average power of x(t) over one period:');
disp(double(P_avg));

Average power of x(t) over one period:
    6.5000
```

Given the discrete - time signal x[n] ={1,-2,3,-4,5}:

1)Determine the length of the signal.

```
>> % Given discrete-time signal x[n]
x = [1, -2, 3, -4, 5];

% Determine the length of the signal
signal_length = length(x);

% Display the result
disp('Length of the signal x[n]:');
disp(signal_length);
Length of the signal x[n]:
     5
```

2)Find the value of x[3].

```
>> % Given discrete-time signal x[n]
x = [1, -2, 3, -4, 5];

% Find the value of x[3]
x_3 = x(3);

% Display the result
disp('Value of x[3]:');
disp(x_3);
Value of x[3]:
     3
```

3)Compute the sum of all elements in the signal.

```
>> % Given discrete-time signal x[n]
x = [1, -2, 3, -4, 5];

% Compute the sum of all elements
sum_of_elements = sum(x);

% Display the result
disp('Sum of all elements in the signal x[n]:');
disp(sum_of_elements);
Sum of all elements in the signal x[n]:
     3

>>
```

4) Calculate the energy of the signal.

```
>> % Given discrete-time signal x[n]
x = [1, -2, 3, -4, 5];

% Calculate the energy of the signal
signal_energy = sum(abs(x).^2);

% Display the result
disp('Energy of the signal x[n]:');
disp(signal_energy);
Energy of the signal x[n]:
    55

>>
```