```
%% INITIALIZE
%  clearvars
%  close all
%  clc
% LOAD YOUR SIGNAL
x = importdata('A01352482_fs1200Hz.txt');
% STEP 1: TIME-DOMAIN ANALYSIS
% Provide a full description of your signal based on all the time-domain
% information you can extract. For instance:
%   Identify any oscillatory activity
%   Identify any noisy activity
fs       = 1200;          % Hz
ts       =  1/1200;         % s
%   Compute all signal information such as length and duration
L        = length(x);          % samples
t        = linspace(0,(L-1)*ts,L);
tini     = min(t);          % seconds
tfin     = max(t);          % seconds
Sdur = tfin -tini;
L2 = Sdur*fs-1;
%   Plot the signal
figure
subplot(4,1,1)
plot(t,x)
title('TIME-DOMAIN ANALYSIS')
xlabel('Time')
ylabel('x(t)')
hold on
%   Compute more signal information such as peak to peak voltage
Vpeakpos    = max(x);
Vpeakneg    = min(x);
Vpp         = Vpeakpos + Vpeakneg;
Average     = mean(x);
Std         = std(x);
% STEP 2: FREQUENCY-DOMAIN ANALYSIS
% Provide a full description of your signal based on all the time-domain
% information you can extract. For instance:
%   Plot the Fourier spectrum
%   Identify any oscillatory activity
%   Identify any noisy activity
Nfft  =   2 ^ nextpow2(L);
X     = fft(x,Nfft); % Compute FFT
k     = 0:1:Nfft-1;            % k=0,1,..,Nfft
w     = (k/Nfft)*2*pi;         % frequency from 0 to 2*pi
f     = (k/Nfft);               % frequency from 0 to 1
fHz   = f*fs;                   % frequency from 0 to fs
% Half period
X2      = X(1:Nfft/2);
w2      = w(1:length(w)/2);
f2      = f(1:length(f)/2);
fHz2    = fHz(1:length(fHz)/2);
Xmag  = abs(X2);  % Magnitude
Xpha  = angle(X2); % Phase
```

```
% Plot x(t)
subplot(4,1,2)
plot(fHz2,Xmag)
title("x(t)")
grid on
% Plot FFT mag
subplot(4,1,3)
plot(w2,Xmag)
title("Magnitud")
hold on
% Plot FFT phase
subplot(4,1,4)
plot(w2,Xpha)
title("Fase")
grid on
%STEP 3: GET SIGNAL ECUATION
% Write the mathematical time-domain equation of your signal,
% i.e., infer an equation as:
% x(t) = *cos(2*pi*f1*t+p1) + A2*cos(2*pi*f2*t+p2)
% Argue the seleccion of all parameters
%STEP 4: DESING AND APPLY A FIR LOW PASS FILTER (ALLOW ONLY THE LOW-FREQ)
% Desing the filter and plot the filter frequency response
N   = 100;        % FIR filter order lineal number of sampling
Wc = 2*pi*10/fs; % Rango de frecuencias
Lcut = -2000; %Cutoff freq
Ucut = 2000; %Cutoff freq
flength = N;
ffir = 80; % kHz del filtro
[b,a] = butter(N,Wc);
fvtool(b,a);
freqz(b,a)
vma
% Apply the filter using yout own implementation of the difference equation
%   and obtain the filtered signal
% Plot the magnitud frequency spectrum of the original and filtered signal
% Plot the time-domain original and filtered signal
%% STEP 5: DESING AND APPLY A IRR HIGH PASS FILTER (ALLOW ONLY THE HIGH-FREQ)
% Desing the filter and plot the filter frequency response
% Apply the filter using yout own implementation of the difference equation
%   and obtain the filtered signal
% Plot the magnitud frequency spectrum of the original and filtered signal
% Plot the time-domain original and filtered signal
%% STEP 6: DRAW CONCLUSIONS
% What are the more important lessons you learned here? Provide detailed
% several conclusions
```