Exercises chapter 10:

We want to design the following low-pass filter and use it to filter the signal FIRECG.txt (you can download this from the website). The file contains a standard 12 lead ecg where the leads (in reality only 8) are in columns in the following order: I, II, V1, V2, V3, V4, V5, V6.
The following specifications have to be met:
- DC-gain: 0 dB
- Passband: 0<f<50 Hz
- Maximum ripple in the passband: 1 dB
- Stopband: f>70 Hz
- Stopband attenuation > 40 dB
- Sample frequency: 500 Hz

1a) Use MatLabs function “fir1” to design a FIR filter that meets the requirements using the Kaiser window. First calculate the filter order, and beta for the Kaiser window.
1b) Does the filter meet the specifications?
1c) Did you create a type I, II, III, or IV FIR filter?

2a) (Exercise 2 *is is not part of the ‘pensum’ but illustrates nicely a few differences with the window method when compared with exercise 3*) Design a highpass filter based on the Parks-McClellan optimal filter method (MatLab: “remez”) with a stopband 0<f<20 Hz, and a passband f>30 Hz. Other specs are the same as in 1).
Use MatLab “remezord” to obtain the filter order.
2b) Does the filter meet the specifications?
2c) Did you create a type I, II, III, or IV FIR filter?

3a) Repeat 2), but now with the Kaiser window method.
3b) What are the differences between the results obtained with the Parks-McClellan and with the Kaiser window method? Think of: filter order, behavior in the passband and the stopband, impulse response, and the filtered signal.