Exercise 7

Remez Algorithm (Cont.)

1. Design a lowpass filter with the following specifications:

$$\omega_p = 0.05\pi, \omega_s = 0.1\pi, \delta_p = 0.01, \delta_s = 0.001.$$

   Plot the frequency response of the filter. Verify that the filter meets the specifications. (Hint: `help firpmord`).(5 points)

2. Design a highpass filter that meets the following criteria:

$$\omega_s = 0.02\pi, \omega_p = 0.05\pi, \delta_p = 0.01, \delta_s = 0.001.$$

   Plot the <u>linear scale</u> frequency response of the filter and verify that the filter meets the given specifications with the order calculated with `firpmord`.(5 points)

3. It is desired to design a bandpass filter meeting the following specifications:

$$\omega_{s1} = 0.2\pi, \ \omega_{p1} = 0.25\pi, \omega_{p2} = 0.6\pi, \omega_{s2} = 0.65\pi$$
$$\delta_p = 0.01, \delta_{s1} = \delta_{s2} = 0.001.$$

   Plot the frequency response in linear and dB scale and verify that the filter meets the required criteria.(5 points)

4. Design a bandstop filter with the following specifications:

$$\omega_{p1} = 0.15\pi, \ \omega_{s1} = 0.3\pi, \omega_{s2} = 0.6\pi, \omega_{p2} = 0.75\pi$$
$$\delta_s = 0.001, \delta_{p1} = \delta_{p2} = 0.01.$$

   Plot the linear scale and dB scale frequency response of the filter and verify that the design meets the specifications.(5 points)