Problems 7.10, 12, 17, 18 from Discrete-time Signal Processing, 2nd Edition, Oppenheim & Schafer and

1. \( H(s) = \frac{10}{s(s+10)} \) Use the bilinear transformation to find the corresponding discrete filter. Use \( T = .01 \).

2. Design a first order low-pass discrete filter with a 3 dB corner frequency at \( \omega_p = .25\pi \). Use \( T = .2 \text{ msec} \).

3. Determine the minimum order of a discrete low-pass filter with \( \omega_p = .25\pi \), minimum passband gain of -3 dB, \( \omega_s = .5\pi \), maximum stopband gain of -40 dB. Use a Butterworth design.

4. Determine the minimum order of a discrete low-pass filter with \( \omega_p = .25\pi \), minimum passband gain of -2 dB, \( \omega_s = .5\pi \), maximum stopband gain of -40 dB. Use a Butterworth design.

5. Determine the minimum order of a discrete low-pass filter with \( \omega_p = .25\pi \), minimum passband gain of -2 dB, \( \omega_s = .5\pi \), maximum stopband gain of -40 dB. Use a Chebyshev design.

6. Design a discrete high-pass filter with \( \omega_p = .8 \), minimum passband gain of -3 dB, \( \omega_s = .2 \), maximum stopband gain of -15 dB. Use a Butterworth design.

Note: The special problems above build one upon another.