Problem 1
Explain in detail the operation of the dynamic filter of Figure 5.7 (p. 98) in the DAFX book. Include a derivation of the transfer function of the system for the different operating modes. Explain how it fits in the overall side chain processing path. How will this system behave when the original side chain input signal never exceeds the associated threshold?

Problem 2
Here we will use the design for a peaking filter that uses a second-order all-pass filter, as described in Section 2.3.2 of the DAFX book. First, give an intuitive interpretation of eq. 2.54 – why does this equation result into a peaking filter? Then, using the implementation suggested in Fig. 2.22 or your own, write MATLAB code that implements the filter. Your code should accept as inputs the desired gain $G$ (increase or decrease), the center frequency $f_c$ and the desired bandwidth $f_b$. Plot the frequency response for three different gain factors and their negatives; then fix the gain and produce plots for three different bandwidths (thus duplicating Fig. 2.23).