**PROBLEM 1 (25%)**

To compensate for the "tinny" character of his small speakers and the high-frequency noise of a typical AM rock station, the manufacturer of a proposed miniature radio receiver has hired you to design a "bass boost and treble cut" fixed tone control interstage network.

(a) The approximate frequency response the manufacturer hopes to achieve is shown by the solid straight lines on the graph below. Note that no scale is given on the ordinate. Only relative values of the gains at various frequencies are important, since extra wide-band gain is easy to provide (and the radio user will in any event have a volume control to adjust the overall gain to his/her desires). Find a formula for a rational function $H_1(s)$ corresponding to a stable causal system whose magnitude for imaginary $s$ has approximately the same shape as these asymptotes, up to an arbitrary constant gain factor.