Problem 1: Plot the results of the matlab routines `bode`, `nyquist`, and `nichols`
given the loop transfer function $G(s)H(s) = \frac{20(s + 1)(s + 2)}{s^3}$. Draw (with
either pen or pencil) on each plot and indicate where the phase and gain margins are
measured. Estimate the phase margin and gain margin from each plot. Before plotting
the results of the nyquist routine, be sure to type ‘axis equal’ on the matlab command line. Is the system closed-loop stable?

Problem 2: Plot the results of the matlab routines `bode`, `nyquist`, and `nichols`
given the loop transfer function $G(s)H(s) = \frac{20}{s(s + 1)(s + 2)}$. Draw (with
either pen or pencil) on each plot and indicate where the phase and gain margins are
measured. Estimate the phase margin and gain margin from each plot. Before plotting
the results of the nyquist routine, be sure to capture all locations where the nyquist plot
crosses the real axis and then type ‘axis equal’. Is the system closed-loop stable?

Problem 3: Plot the results of the matlab routines `bode`, `nyquist`, and `nichols`
given the loop transfer function $G(s)H(s) = \frac{5(3 - s)}{(1 + s)(2 + s)}$. Draw (with
either pen or pencil) on each plot and indicate where the phase and gain margins are
measured. Estimate the phase margin and gain margin from each plot. Before plotting
the results of the nyquist routine, be sure to capture all locations where the nyquist plot
crosses the real axis and then type ‘axis equal’. Is the system closed-loop stable?
Problem 4: For the following Bode magnitude and phase diagrams, determine an approximate expression for the transfer function $G(s)$. While matching the phase and magnitude specifications provided, use the smallest possible number of zerospoles in your model. Clearly indicate, with marks on one or both figures, where you extracted each parameter in your model.
Problem 5: For the following Bode magnitude and phase diagrams, determine an approximate expression for the transfer function $G(s)$. While matching the phase and magnitude specifications provided, use the smallest possible number of zeros/poles in your model. Clearly indicate, with marks on one or both figures, where you extracted each parameter in your model.
Problem 6: For the following Bode magnitude and phase diagrams, determine an approximate expression for the transfer function \( G(s) \). While matching the phase and magnitude specifications provided, use the smallest possible number of zeros/poles in your model. Clearly indicate, with marks on one or both figures, where you extracted each parameter in your model.