

Extra Problems for Chapters 14-15**General Note on Extra Problems:**

Occasionally Mastering Engineering does not include certain types of problems that the instructor would like to assign. In such cases the instructor may assign additional problems to be submitted by hand. These problems are worth 1 point each, just as in Mastering Engineering (ME), but the point will be added manually at the end of the semester when they are entered into Blackboard.

Example: Suppose that 65 problems are assigned in ME and you earned 59.1 points by the end of the semester. If the instructor also assigned 5 additional problems and you earned 4.2 points, then your final homework average is $(59.1 + 4.2)/(65 + 5) * 100\% = 90.43$

Extra Problems for Chapters 14-15 (9 pts total)

1) (5 pts) Plot the Bode LM plots for the transfer functions below with to the following specifications:

- use 4 cycle semi-log graph paper (available from instructor's web page)
- label all levels in dB and all slopes in dB/decade

$$G_1(s) = \frac{500(s + 200)}{(s + 4,000)}$$

$$G_2(s) = \frac{500,000}{(s + 200)(s + 1000)}$$

$$G_3(s) = \frac{50(s + 2,000)(s + 5,000)}{(s + 10,000)(s + 80,000)}$$

$$G_4(s) = \frac{5,000(s)(s + 800)}{(s + 200)(s + 4,000)}$$

$$G_5(s) = \frac{0.5(s + 20)^2(s + 500)}{s(s + 100)}$$

2) (2 pts) Plot the Bode phase plot for $G_1(s)$ and $G_2(s)$ above with the following specifications:

- use 4 cycle semi-log graph paper
- label all levels in degrees and all slopes in degrees/decade

3) (2 pts) Plot the **exact** LM and phase plots for $G_1(s)$ and $G_2(s)$ using MATLAB or Excel. Include a printout of both the graph and the spreadsheet or script file (.m) used to produce the graph. Compare the graphs to the Bode plots generated for $G_1(s)$ and $G_2(s)$ in problems 2 and 3.