EE3331C Feedback Control Systems Assignment 2

Let a annd b be the last and second last digits of your matric number. If any digits is 0, replace by 1. For example, if your matric number is A1234560Z, then $a = 1$, $b = 6$.

(a) Consider the following first-order transfer function:

$$G_1(s) = \frac{a}{s+b}$$

Plot the bode plot (use bode.m) for 3 different values of $0.05b$, b and $50b$ fixing the value of a. (Note that $0.1b$ means $0.1 \times b$) Plots the 3 frequency responses on the same plot, comment on what you observe.

(b) Next generate the polar plots for the problem in part(a). To generate the polar plot, you may use the following commands:
$[m, p] = bode(sys)$; (sys is your transfer function, m and p represents magnitude and phase)
$m = m(1, :)$; (to make the magnitude and phase to a 1d array)
$p = p(1, :)$;
$polarplot(p * pi/180, m)$; (polar requires phase in radians, but bode gave in degrees)

(c) Consider the following transfer function

$$G_2(s) = \frac{bs+1}{s^2(cs+1)}$$

Plot the bode and polar plots for the cases where $c = 0.1b$ and $10b$ respectively. Comments on your plots. The following commands can help you to adjust the polarplot axes.
$pax = gca$
$rlim([0\ 50])$ (example, in this case, you change the radius range from 0 to 50 after executing polarplot)

(d) Consider the following transfer function

$$G_3(s) = \frac{a\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$$

Plot the bode and polar plots for the cases where $\zeta = 0.2, 0.5$ and 0.8. Let $\omega_n = b$. Comments on your plots.

Copy your matlab plots and code (add comments to your code so that it is readable!) into a word file, name it as A1234567Z.pdf where A1234567Z is your matric number. Submit to the assignment 2 folder in CANVAS by 1 November 2023 12 noon.