Control Theory Intro: Home Assignment #7

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Introduction

The purpose of this home assignment is to be base your understanding and to gain experience with the Nyquist plot.

Your solutions should be presented in a PDF (not Word!) file. You should submit also a **.m** file. The first line should print your ID.

>> disp('ID_STUDENT_1 ID_STUDENT_2') % disp('ID_STUDENT_1') if only one student is submitting.

For clarity of the script, you can separate the different sections of the script with a **%%**. This will automatically create a block in your script. In order to run specifically this block of code press 'Ctrl+Enter'. To run the entire script press 'F5'.

Main required function:

`nyquist`

1 Nyquist plot

1.1 Draw the Nyquist plot for the following systems:

For a positive parameter $\tau > 0$ draw Nyquist plot of:

1. $$GH(s) = \frac{1}{s+\tau}$$
2. $$GH(s) = \frac{1}{s-\tau}$$

1.2 Draw the Nyquist plot for the following systems:

1. $$GH(s) = \frac{s+8}{3s^2+s+4}$$
2. $$GH(s) = \frac{s+3}{s^2}$$
3. $$GH(s) = \frac{15+5s}{s^2-4s+8}$$
4. $$GH(s) = \frac{2s+1}{s^3+2.5s^2+5s+8}$$

1.3 Stability:

For the following systems, draw the Nyquist plot and find for which k the close loop systems are stable:

1. $$GG_C(s) = \frac{1}{10}\frac{1}{s^3 + 7s^2 + 4s + -12}$$

2. $$GG_C(s) = \frac{s+5}{s^4 + 3s^3 - s^2 + 27s - 90}$$

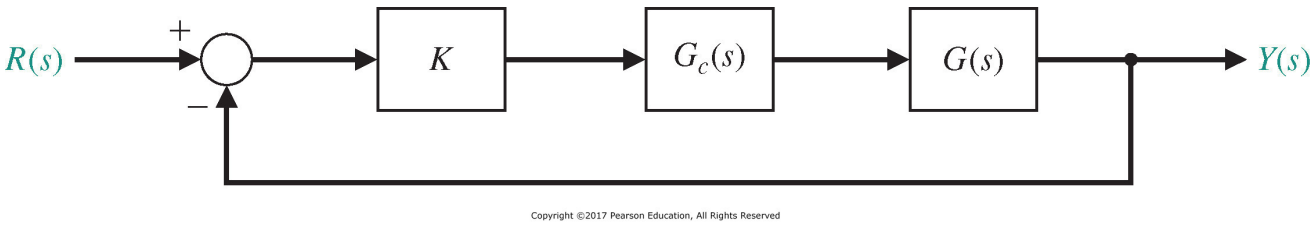

Figure 1: