Introduction to RIS
Spring term 2022
Date: Apr 29, 2022

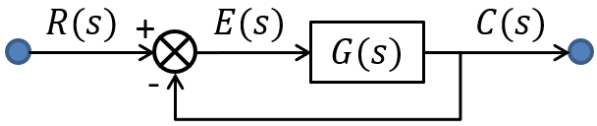
Course CH-220-A
M. Bode

Practice Problems II - 05

Practice problems are supposed to help you digest the content of the lecture. It is important that you manage to solve them on your own. Before you write your solutions, you may of course ask questions, and discuss things. In order to prepare for the exam, already now, try to explicitly write down your solutions – clearly and easy to read. Apply definitions properly, and give explanations for what you are doing. That will help you to understand them later when you prepare for the final exam.

I. Block Diagrams and Feedback Loops

Consider the feedback loop to the right. Its closed loop transfer function is $T(s)$.
Now, answer the following questions:



a) Assume that $G(s) = \frac{5}{s-2}$. What is the resulting $T(s)$?

Now, suppose we choose a unit-step input, that is, $\mathrm{R}(s) = \frac{1}{s}$.
Write the resulting output signal $C(s)$. Also, find the error signal $E(s)$.

Next, write the corresponding signals $c(t)$, and $e(t)$ in time domain.

Finally, calculate the final values $\lim_{t\to\infty} c(t)$, and $\lim_{t\to\infty} e(t)$.

Can you obtain those final values of $c(t)$, and $e(t)$ without the detour through the time domain?

b) Repeat part a for a plant $G(s) = \frac{1}{s-3}$