

ENEE 460 Fall 2016 Homework Set 2: Due back at the START of class Wednesday September 14, 2016

1. Consider the closed-loop system in Figure 2.19 where the process and the feedback controller have the transfer functions

$$P(s) = \frac{b}{s+a}, \quad C(s) = k_p + \frac{k_i}{s}.$$

Assume that the desired response to command signals is given by the transfer function

$$F_m(s) = \frac{a_m}{s+a_m}.$$

Determine the feedforward transfer function  $F_f(s)$  that gives the desired transfer function  $F_m$ . Determine the transfer functions  $G_{yr}$  and  $G_{y\nu}$  which tell how the closed-loop system responds to reference  $r$  and load disturbance  $\nu$ . Briefly discuss feed-forward vs. feedback control for this example.

2. Read Sections 2.2 and 2.3 of the book

Then do Problems 2.5, 2.6, 2.7 and 2.9