Name and surname: .....

Control Systems

January 11, 2011

1. Given the system described by the transfer function

$$G(s) = \frac{2}{s-4}$$

having a step disturbance acting on its input, determine a feedback control scheme and a PI controller of the form

$$G_c(s) = k_P + \frac{k_I}{s}$$

such that

a) the effects of the disturbance is zero in steady–state;

b) the system is capable to reproduce linear ramps with a maximum error of 0.8;

c) the time instant after which the transient can be considered zero has to be less or equal to 6 s;

d) calculate the step response of the feedback system.

[10 points]

2. Consider the transfer function $G(s) = \frac{1}{s(s-2)}$. Use the root locus to design a feedback control scheme and a controller $G_c(s)$ such that the real part of the poles of the closed loop system is less than -3. Use the Routh Criterium to compute the range of values of the gain of $G_c(s)$ such that the above specification on the position of the poles of the closed loop system is satisfied. [10 points]

3. Illustrate the Routh's criterion (maximum 2 pages).
[10 points]