UNIVERSITY OF VICTORIA

MIDTERM – OCTOBER 2014

ELEC 360 – CONTROL THEORY AND SYSTEMS I

SECTIONS A01, A02

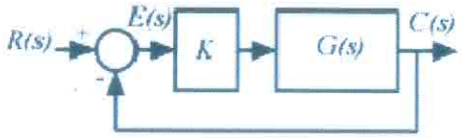
INSTRUCTOR: Dr. P. Agathoklis **DATE:** October 21, 2014

DURATION: 50 minutes

TWO (2) PAGES OF NOTES AND PHOTOCOPIES OF LAPLACE TRANSFORMS ARE PERMITTED.

Marks

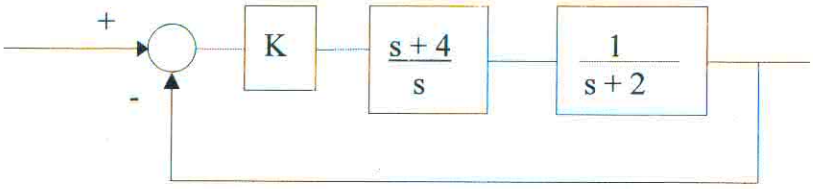
(4) 1. Consider a system given by:



where $K=2$ and $G(s)$ is an integrator. Find the response $c(t)$ of the closed-loop system when the input is given by:

$$r(t) = \begin{cases} 1 & for \quad 0 \le t \le 2 \\ 0 & else \end{cases}$$

(6) 2. Consider the system given by:



a.) Sketch the root-locus of the above system.
b.) Discuss the transient part of the unit step response of the closed-loop system when K goes from 0 to ∞. Justify your answers.

(2) 3. Consider the system given in question 2. For what values of K is the steady state error for a unit step input and for a unit ramp input less than 0.5? Justify your answers.

(4) 4. Consider the unity negative feedback system with open-loop transfer function given by:

$$G(s)H(s) = \frac{K}{s^3 + 4s^2 + 2s}$$

Find for what values of K is the closed-loop system stable

END