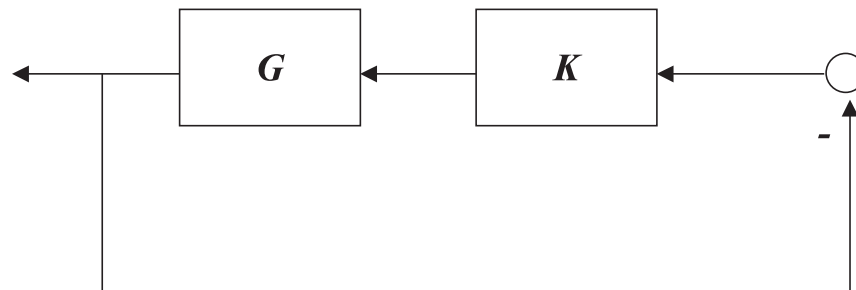


## Homework # 4

Due: 10/16/2006

1. (30%) Consider the following control system with

$$G(s) = \frac{1}{s+1} \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$



- (a) Let  $K = kI_{2 \times 2}$ . Use the Multivariable Nyquist Criterion to find the range of  $k$  such that the closed loop system is stable.
- (b) Suppose  $K = \text{diag}\{k_1, k_2\}$ ,  $k_i$  is real. Try repeatedly apply the Multivariable Nyquist Criterion to estimate the region in the  $\{k_1, k_2\}$  plane that the system is stable.
2. (20%) 5.1
3. (25%) 5.7
4. (25%) 5.8