Homework #7: ECE 461/661

Error Constants, Routh Criteria, Sketching a Root Locus. Due Monday, October 15, 2018

Error Constants:

1) Fill in the following table\

Open-Loop System G(s)	Type 0 - 1 - 2	Kp	Kv	Steady-State Error for a Step Input
$\left(\frac{20}{(s+2)(s+5)}\right)$				
$\left(\frac{20}{(s-2)(s+5)}\right)$				
$\left(\frac{20}{s(s+2)(s+5)}\right)$				
$\left(\frac{20(s+1)}{s^2(s+2)(s+5)}\right)$				

Routh Criteria

Using a Routh table, determine the range of K which results in a negative-definate polynominal (i.e. a stable closed-loop system)

2) $(s+2)(s+5)(s+10)+2k=0$

3) $(s-1)(s+5)(s+9)(s+10)+2k(s+1)=0$

4) $s^2(s+2)(s+5)+2k(s+1)=0$

Sketching a Root Locus

Draw the root locus plot for the following systems (it's OK to use Matlab). Calculate and show on your plots

- The real-axis loci,
- The breakaway point(s),
- The jw crossing(s),
- The asymptotes, and
- The approach angles (if any)

5) $G(s)=\left(\frac{2}{(s+2)(s+5)(s+10)}\right)$

6) $G(s)=\left(\frac{2(s+1)}{(s-1)(s+5)(s+9)(s+10)}\right)$

7) $G(s)=\left(\frac{2(s+j2)(s-j2)}{s(s+2)(s+5)(s+10)}\right)$

8) $G(s)=\left(\frac{20}{s(s+2)(s+5)(s+10)}\right)$