Homework #6: ECE 461/661

Error Constants, Routh Criteria, Skething a Root Locus. Due Monday, October 12th

Error Constants

1) Determine the error constants and steady-state error for the following systems

G(s)	System Type	Kp	Kv	Error for a unit step input
$\left(\frac{20}{(s+3)(s+10)}\right)$				
$\left(\frac{20}{s(s+3)(s+10)}\right)$				
$\left(\frac{20(s+1)}{s^2(s+3)(s+10)}\right)$				
$\left(\frac{20}{(s-3)(s+10)}\right)$				

Routh Criteria

Determine the range of k that results in a negative definite polynomial (i.e. a stable system)

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

3) $(s+1)(s+3)(s+7)(s+8)+5k=0$

Sketching a Root Locus

Sketch the root locus plot for the following systems for 0 < k < infinity. Also plot the

- real axis loci, break away points, jw crossings (if any), and asymptotes

4) $(s-1)(s+4)(s+5)+5k=0$

5) $(s+1)(s+3)(s+7)(s+8)+5k=0$

Root Locus with Complex Poles

Sketch the root locus plot for the following systems for 0 < k < infinity. Also plot the

- real axis loci, break away points, jw crossings (if any), asymptotes, and departure/approach angle

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

7) $G(s)=\left(\frac{s^2+4}{s(s+2)(s+5)(s+6)}\right)$