

# Homework #7: ECE 461/661

Error Constants, Routh Criteria, Sketching a Root Locus. Due Monday, October 14th

## 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
$\left(\frac{100}{(s+1)(s+5)}\right)$				
$\left(\frac{100}{s(s+1)(s+5)}\right)$				
$\left(\frac{100(s+2)}{s^2(s+1)(s+5)}\right)$				
$\left(\frac{100}{(s-1)(s+5)}\right)$				

## Routh Criteria

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

2)  $(s - 1)(s + 6)(s + 12) + 3k = 0$

3)  $s(s + 4)(s + 6)(s + 12) + 3k = 0$

## Sketching a Root Locus

Sketch the root locus plot for the following systems for  $0 < k < \infty$ . Also plot the

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

4)  $(s - 1)(s + 6)(s + 12) + 3k = 0$

5)  $s(s + 4)(s + 6)(s + 12) + 3k = 0$