

4.

s^5	1	3	2
s^4	-1	-3	-2
s^3	-2	-3	ROZ
s^2	-3	-4	
s^1	-1/3		
s^0	-4		

Even (4): 4 jω; Rest(1): 1 rhp; Total (5): 1 rhp; 4 jω

21.

$$T(s) = \frac{K(s+6)}{s^3 + 5s^2 + (K+4)s + 6K}$$

s^3	1	4 + K
s^2	5	6K
s^1	20 - K	0
s^0	6K	0

Stable for $0 < K < 20$

20.

Find the equivalent $G(s)$ for a unity feedback system. $G(s) = \frac{K}{s(s+1)} = \frac{K}{s(s+1)}$. Thus, $e(\infty) =$

$$\frac{100}{K_v} = \frac{100}{K/11} = 0.01; \text{ from which } K = 110,000.$$

38.

$e(\infty) = \lim_{s \rightarrow 0} \frac{sR(s) - sD(s)G_2(s)}{1 + G_1(s)G_2(s)}$, where $G_1(s) = \frac{1}{s+4}$ and $G_2 = \frac{100}{s+2}$. From the problem

statement,

$$R(s) = D(s) = \frac{1}{s}. \text{ Hence, } e(\infty) = \lim_{s \rightarrow 0} \frac{1 - \frac{100}{s+2}}{1 + \frac{1}{s+4} \frac{100}{s+2}} = -\frac{49}{12.5} = -3.92.$$