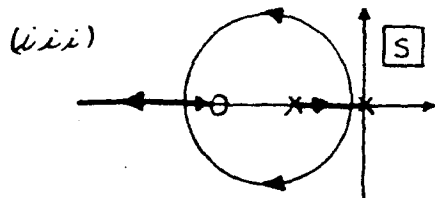
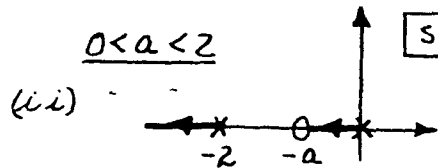
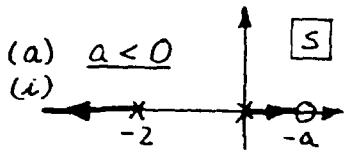


7.8.  $KG(s) = \frac{K_1(s+a)}{s(s+2)}$



(b) For  $a > 2$ , i.e., (iii)  
For (ii), one slow root.  
For (i), unstable.

(c) (i) always unstable

(d) (iii) critical damping at the two breakaway points.

8.1. (a)  $G(j2) = \frac{50}{(1+j2)(2+j2)(10+j2)} = \frac{50}{(2.236 \angle 63.4^\circ)(2.828 \angle 45^\circ)(10.20 \angle 11.3^\circ)}$   
 $= 0.275 \angle -119.7^\circ$

$G(j10) = \frac{50}{(1+j10)(2+j10)(10+j10)} = \frac{50}{(10.05 \angle 84.3^\circ)(10.20 \angle 78.7^\circ)(14.14 \angle 45^\circ)}$   
 $= 0.0350 \angle -208^\circ$

(b)  $0.707 G(0) = 0.707(2.5) = 1.768$ ,  $\therefore BW \approx 0.825 \text{ rad/s}$

(c)  $\tau_1 = \frac{1}{1} = 1s$ ,  $\tau_2 = \frac{1}{2} = 0.5s$ ,  $\tau_3 = \frac{1}{10} = 0.1s$