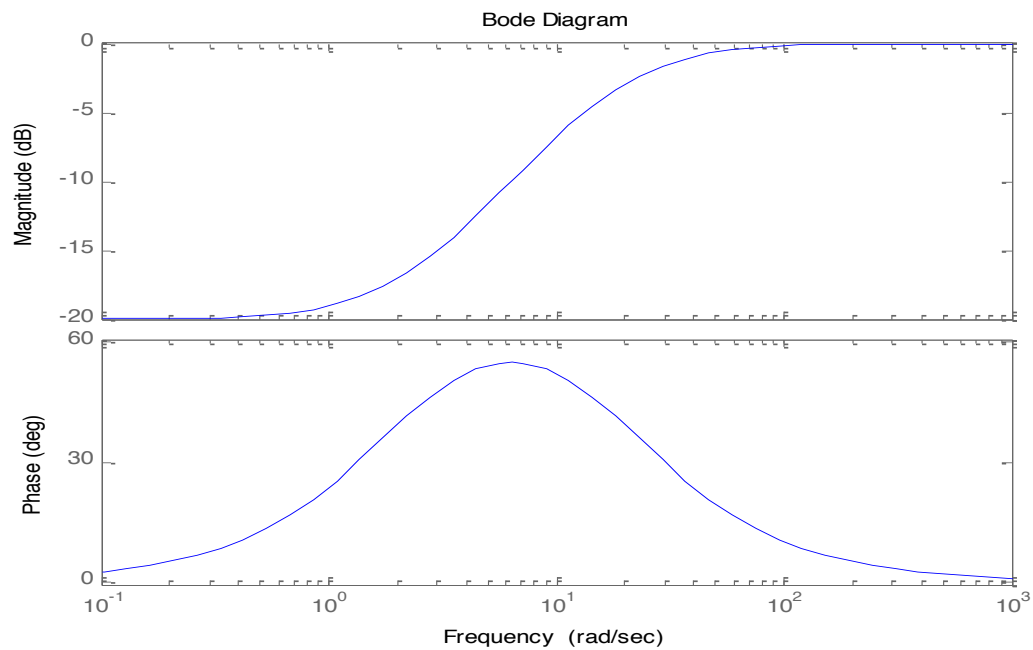
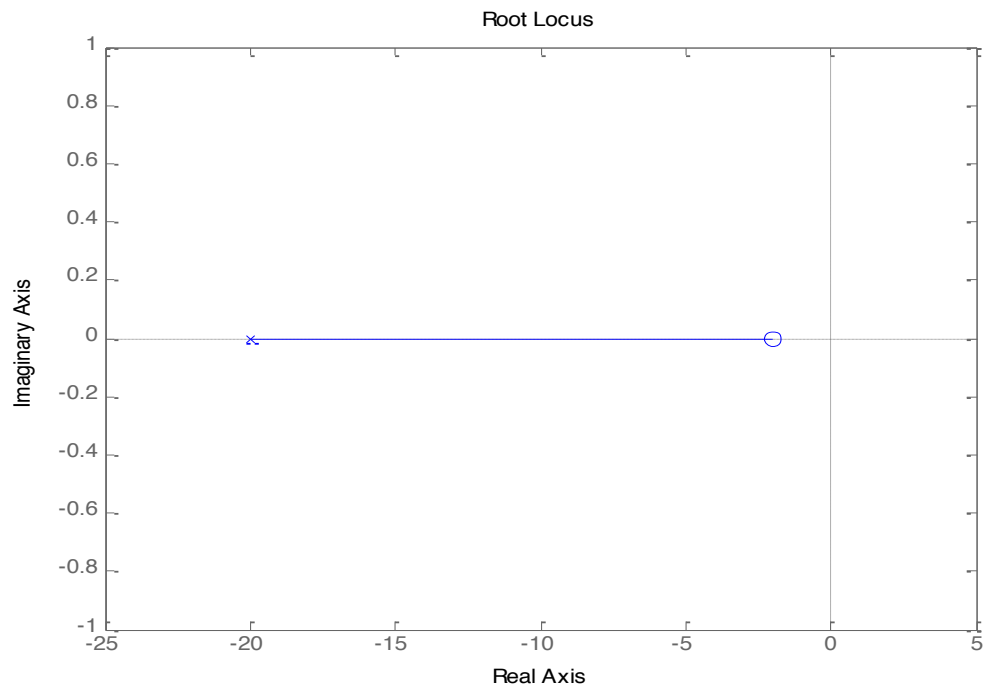


Problem 6.16a

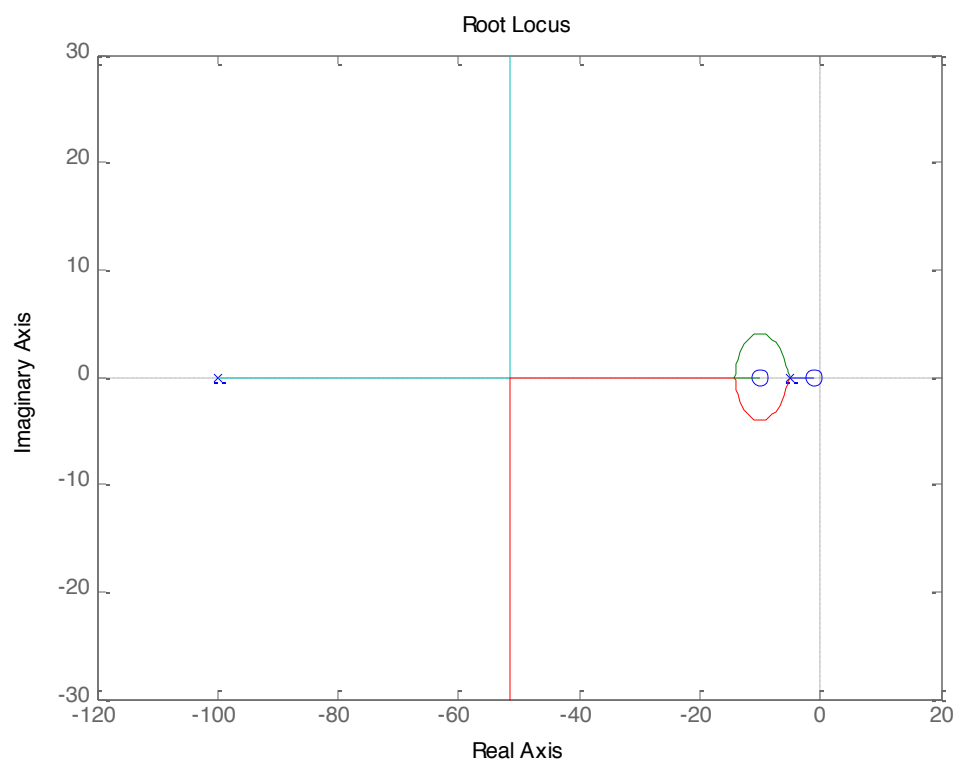
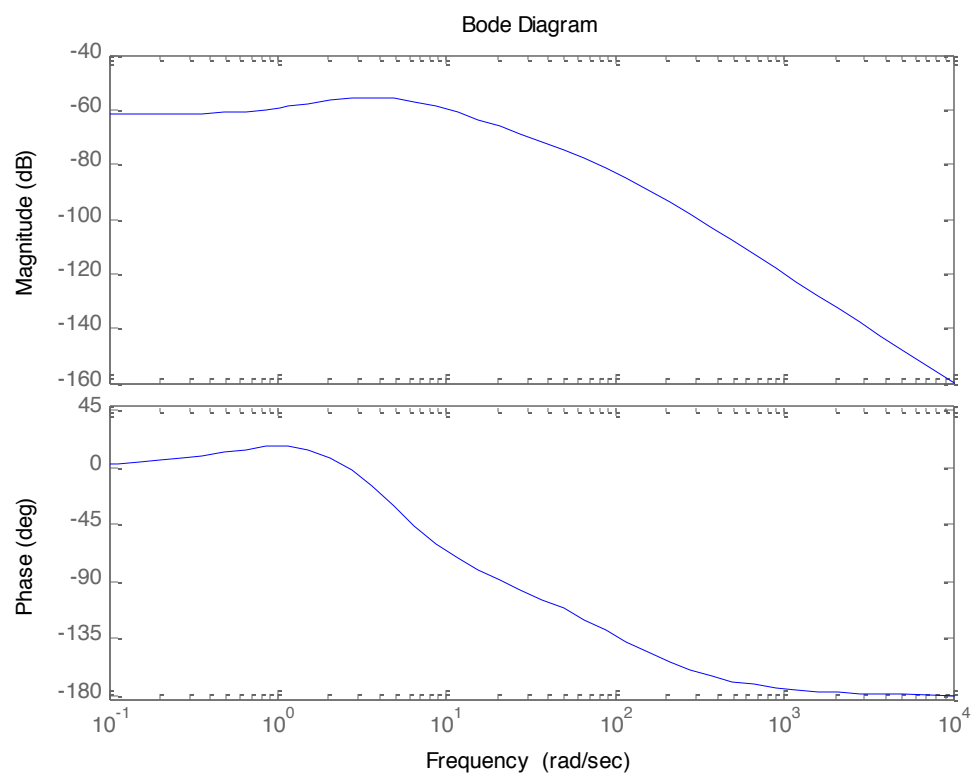
Find the point of neutral stability using the Bode plot and changing the K value. Point of neutral stability as where the freq. of the gain margin and the phase margin are the same. The gain can be raised or lowered on the Bode gain plot and the phase will never be less than -180° , so the system is stable for any $K > 0$:





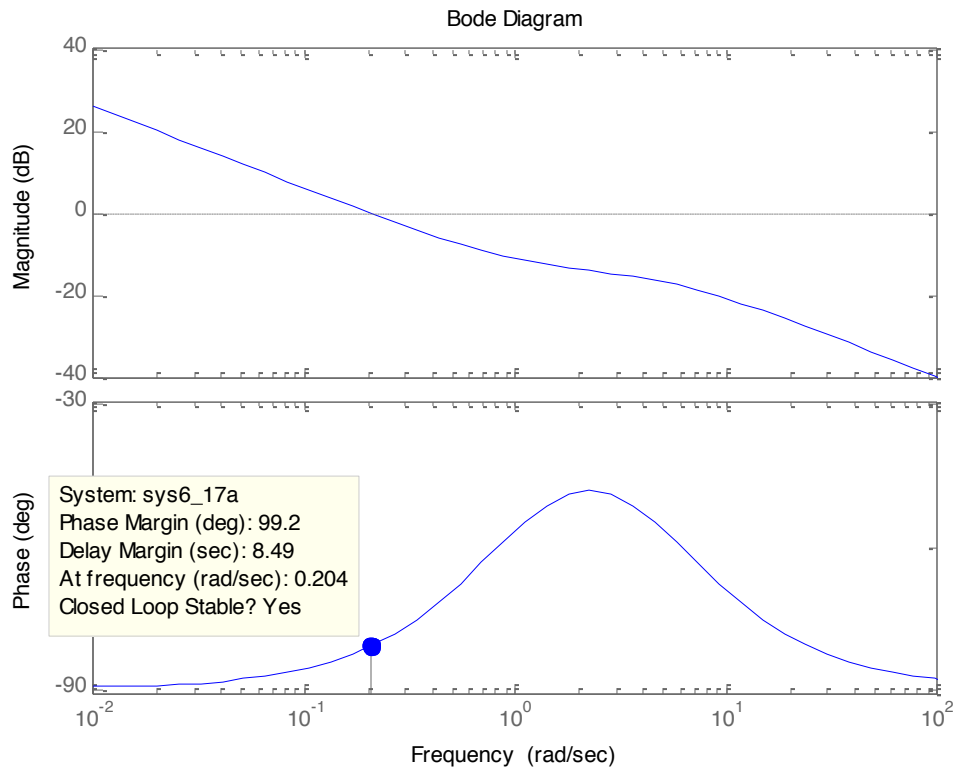
Problem 6.16c

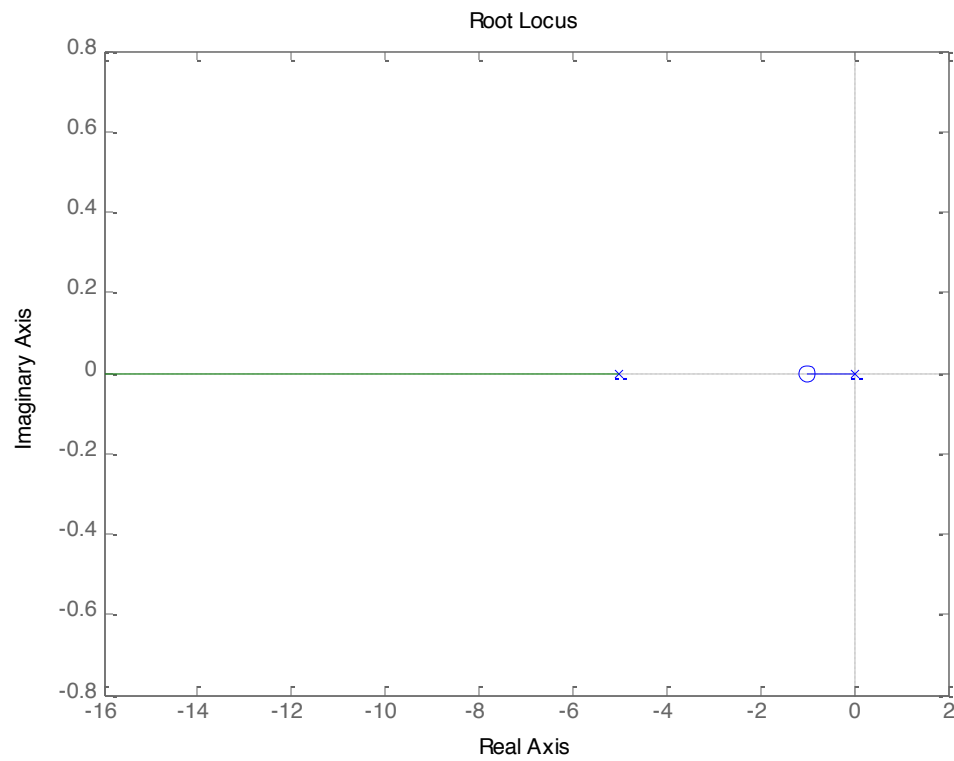
Find the point of neutral stability using the body plot and changing the K value. The phase never crosses -180 so it is stable for all $K > 0$; as confirmed by the root locus.



Problem 6.17a

The phase never crosses -180 so it is stable for all $K > 0$; as confirmed by the root locus.





Problem 6.17d

This is not the normal situation discussed in Section 6.2 where increasing gain leads to instability. Here we see from the root locus that K must be ≥ 6.17 in order for stability. Note that the phase is increasing with frequency here rather than the normal decrease we expect to see.

