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Elct/Elct Engineering

EEE 471 Assignment

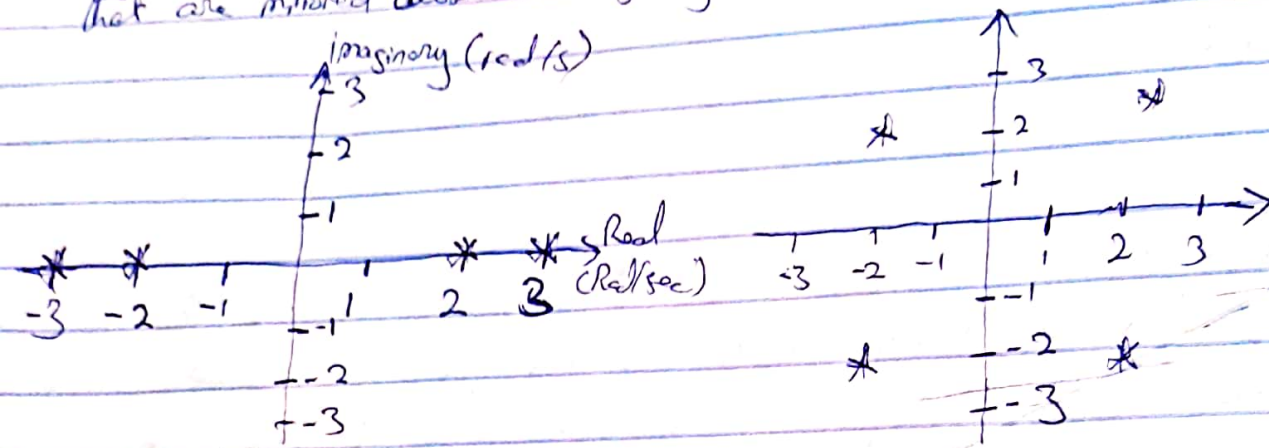
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1) The Root Locus technique is a graphical method in which roots of the characteristic equation are plotted in the  $s$ -plane for the different values of parameter. The characteristic equation when  $g(s)$  varied from zero to infinity is called root locus.

### Rules of Root locus

- 1) The root locus is always symmetrical about the real axis.
- 2) The root locus always start from the open-loop poles  $K$  terminates on either finite open loop or zero infinity.

2) A whole row of zeros indicates the presence of pairs of poles that are mirrored about the imaginary axis



- At best, the system is marginally stable
- Use a Routh table to determine if it is unstable
- If an entire row of zeros appears in a Routh table

- i) Create an auxiliary polynomial from the row above the row of zero, skipping every other power of  $s$
- ii) Replace the zero row with the coefficients of the resulting polynomial
- iii) Differentiate the auxiliary polynomial w.r. to  $s$ .
- iv) Complete the Routh table as usual
- v) Evaluate the signs of the first column of entries

b) To determine the poles on the  $j\omega$  axis

4<sup>th</sup> Determine the system poles for the under damped system. The poles are  $= \sigma \pm j\omega$