Control System Laboratory Report

Name and ID no. of the Student:

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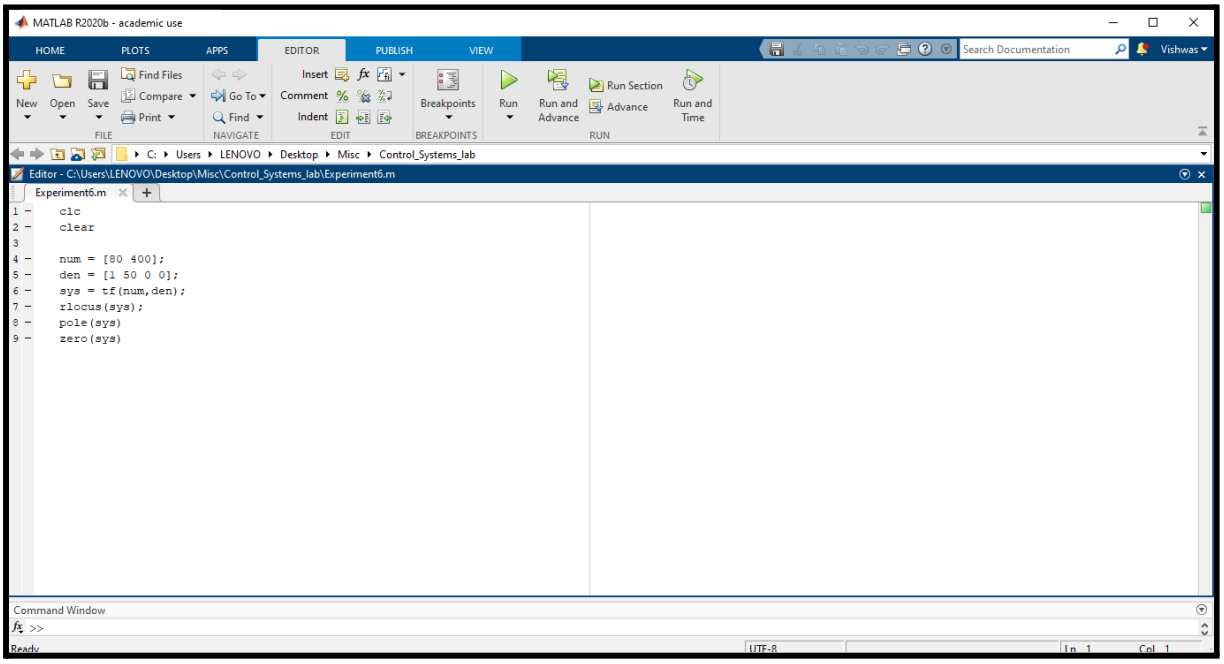
Title of the Experiment:

Root Locus for Stability Analysis.

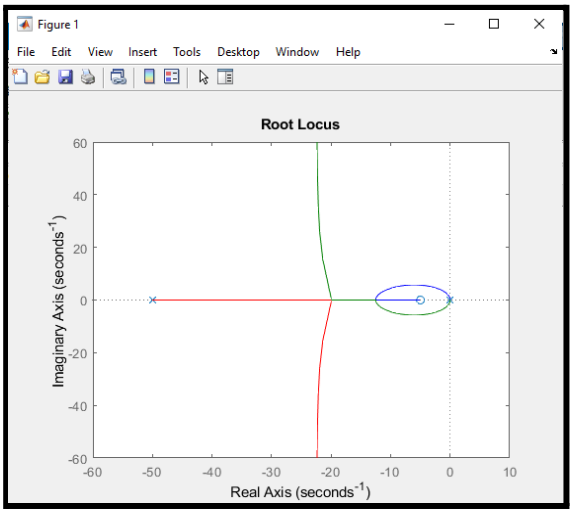
Model/Simulation:

The image below shows the MATLAB code for the root locus plot of the system.

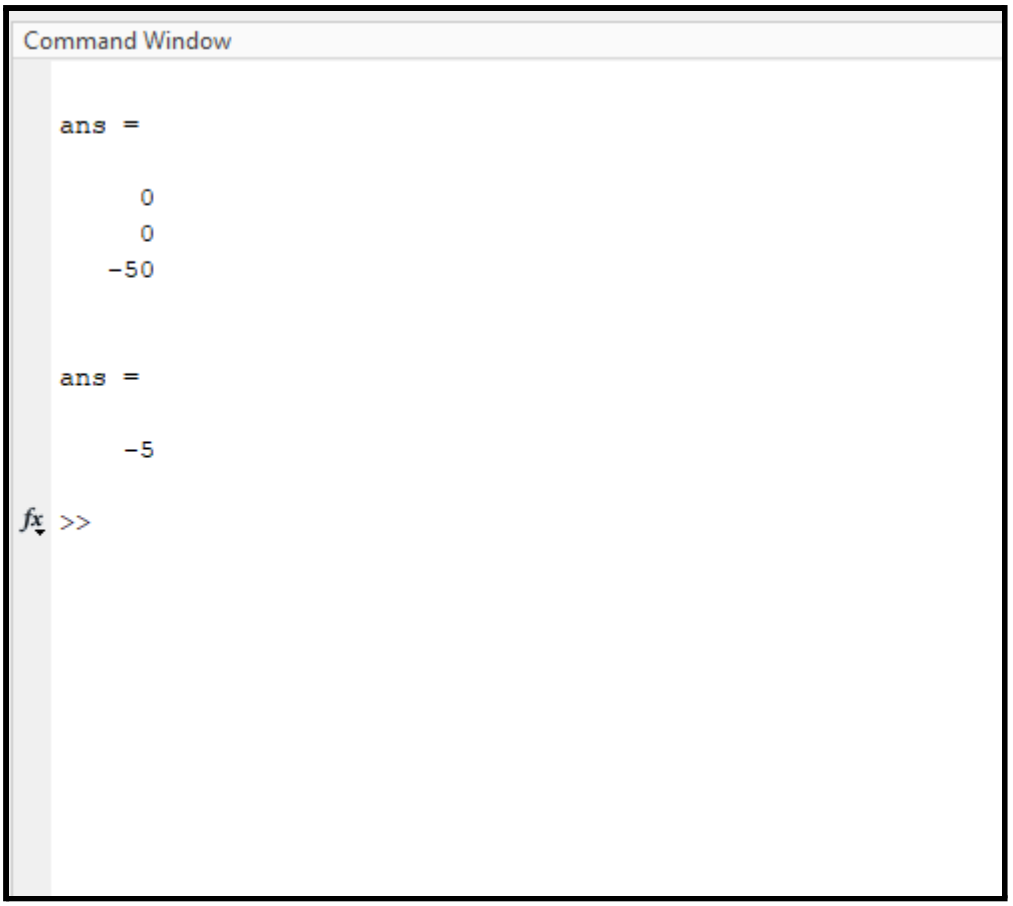


Results:

The plot shows the root locus of the system.



The image below shows the poles and zeros of the system.



Conclusive Remarks:

Root locus analysis is a graphical method for examining how the roots of a system change with variation of a certain system parameters, commonly a gain within a feedback system. This analysis gives us insight into the stability of the system as well. Since all the poles and zeros of the system are to the left half of the s-plane, the system is stable for all values of gain.

In addition to determining the stability of the system, the root locus can be used to design the damping ratio and natural frequency of a feedback system. Lines of constant damping ratio can be drawn radially from the origin and lines of constant natural frequency can be drawn as arccosine whose center points coincide with the origin. By selecting a point along the root locus that coincides with a desired damping ratio and natural frequency, a gain K can be calculated.

Apart from Root locus analysis, other forms of stability analysis exist like Bode Plots, Routh–Hurwitz stability criterion, Nyquist Plot, etc.