Computer and Systems Engineering
DepartmentAutomatic Control Course
Second Year

Programming Assignment

Signal Flow Graphs &

Routh Stability Criterion

Part 1: 80% of the assignment grade

Given:

Signal flow graph representation of the system. Assume that total number of nodes and numeric branches gains are given.

Required:

1- Graphical interface.
2- Draw the signal flow graph showing nodes, branches, gains, …
3- Listing all forward paths, individual loops, all combination of *n* non-touching loops.
4- The values of Δ , $\Delta 1$, …, Δm where *m* is number of forward paths.
5- Overall system transfer function.

Part 2: 20% of the assignment grade

Given:

Characteristic equation of the system. Assume that all the coefficients of s^0 to s^n are given.Input example: s^5+s^4+10s^3+72s^2+152s+240

Required:

1- Using Routh criteria, state if the system is stable or not.
2- If the system is not stable, list the number and values of poles in the RHS of the s-plane.

Notes for both parts:

Each team must submit the following:

a- Your executables and source code (using git is preferable)
b- Report should include:
   1) Problem Statement.
   2) Main Features of the program and additional options if exists.
   3) Data Structure.
   4) Main modules.
   5) Algorithms used.
   6) Sample runs.
   7) Simple user guide.

- Use any programming language you want.
- You can work in teams of a maximum of **five students.**
- The grade of this programming assignment represents **50% of total lab part grade,** so make sure you invest the best efforts in this assignment.
- The programming assignment period is **7 weeks** in addition to midterm week.

Good Luck