Controllability and Stability

Stability and Controllability

0.0/18.0 points (graded)

For this problem, answer a series of questions related to some of the basic notions discussed in lecture.

Cubic Plant

Consider the one-dimensional system $\dot{x} = -x^3$. Using graphical analysis, is the trivial equilibrium stable or unstable?

- stable
- unstable
- cannot tell

What is the eigenvalue of the linearized system?

Does the linearization indicate stability?

- stable
- unstable

- cannot tell

Controllability and Underactuation

Select any true statement.

- A system that is controllable is fully-actuated.
- A system that is fully-actuated is controllable.

Linear Quadratic Regulators

Suppose we have a controllable system, where the linearization is $\dot{x} = Ax + Bu$. For $Q \succ 0$ and $R \succ 0$, we can find the LQR controller with feedback gain matrix K.

What can we say about the eigenvalues of A?

- All eigenvalues have negative real part
- Some eigenvalues have a positive real part
- It depends on the system

What can we say about the eigenvalues of $A - BK$?

- All eigenvalues have negative real part
- Some eigenvalues have a positive real part
- It depends on the system

Submit You have used 0 of 1 attempt