

In part c, we have linearized our equations and hence, we will be looking to use a linear controller.

There are two controllers talked about in the presentation.

1. Pole Placement

2. Linear Quadratic Regulator

The Pole Placement method has certain uncertainty regarding eigen values, and given that I don't have much experience in designing control systems, I will not prefer the Pole Placement Controller

The Linear Quadratic Regulator is a more regularized with a standard procedure and hence, I will prefer the Linear Quadratic Regulator.

The Linear Quadratic Regulator works on the concept of optimal control by minimizing a predefined cost function.

The Cost here is a linear system of equations where we penalize both the control effort and the error.

We have the Linear Dynamical control system for State-Space Equation, we have the reference equilibrium points

and the cost function which needs to be optimized. We apply the principles of dynamic programming to go from the

final state to the initial state. The recursive relation in the equations gives us the net value which include current cost, Action Cost, and the Closed loop dynamics - $(\text{transpose}(\text{state-space}) * \text{Future Value matrix} * \text{state-space})$.