Lab 3 Report Format - ECE557

Cover page:

- title and course number
- names and student numbers
- lab date
- submission date

Note:

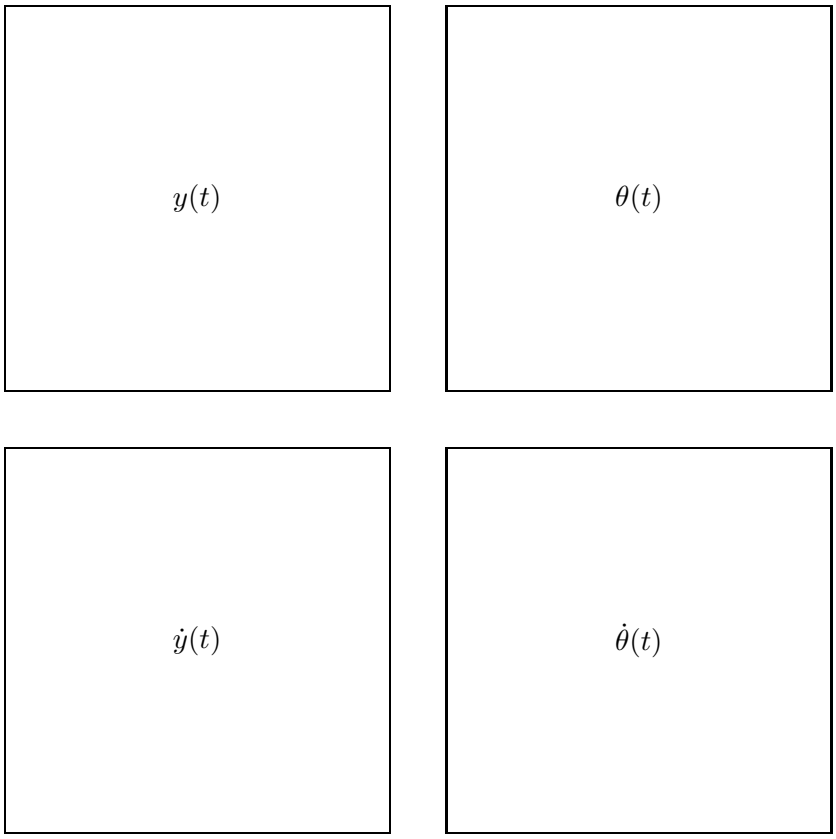
- Both handwritten and typed reports are acceptable.
- Please don't use a lab book for the report.
- The lab report is due one week after your lab session.

1 Introduction

- introduce lab including brief explanation of the inverted pendulum
- nonlinear differential equations, followed by the linearized model (A, B, C, D) in terms of the parameters g, l, M, m, and the numerical values

2 SF Controller I and II

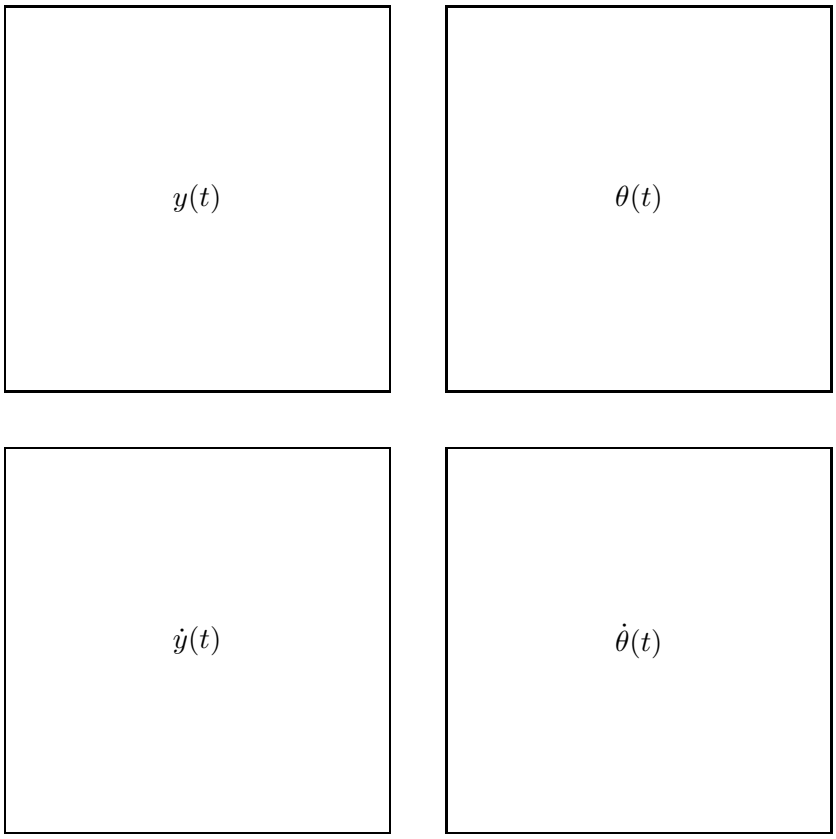
This section contains the response of the linearized system to both pole placement controllers (on the same axis).



Controller gain I: $K = \ldots$
Closed loop poles I:
Controller gain II: $K = \ldots$
Closed loop poles II:
Description:

3 OF Controller I

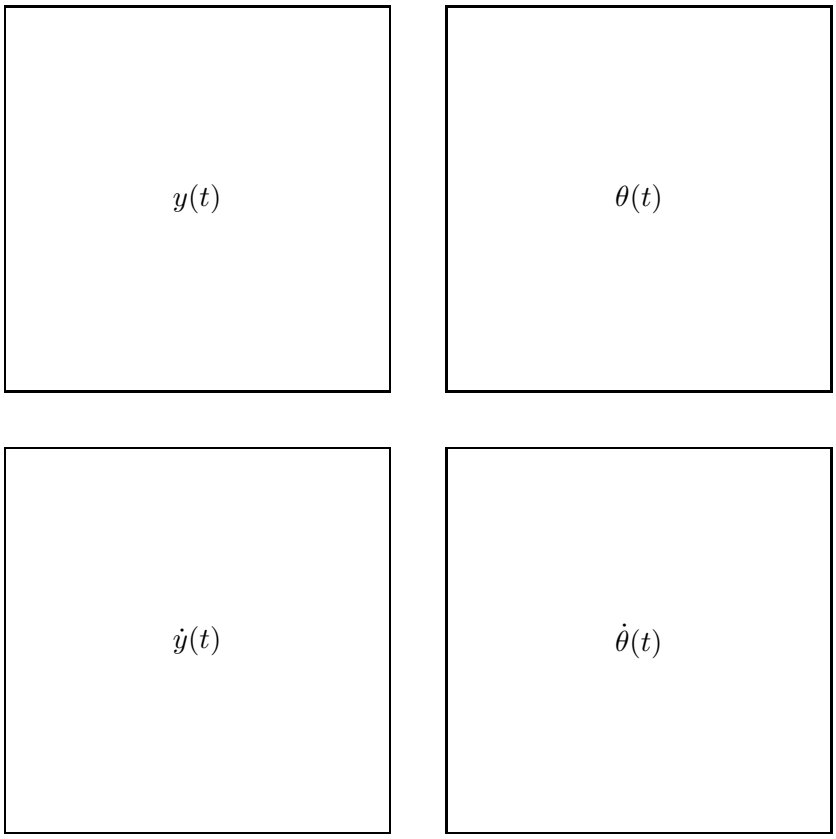
This section contains the response of the linearized system to the first pole placement controller with the observer. Plot the state and its estimation on the same axis.



Observer gain: $L = \ldots$
Observer poles:
Description:

4 OF Controller II

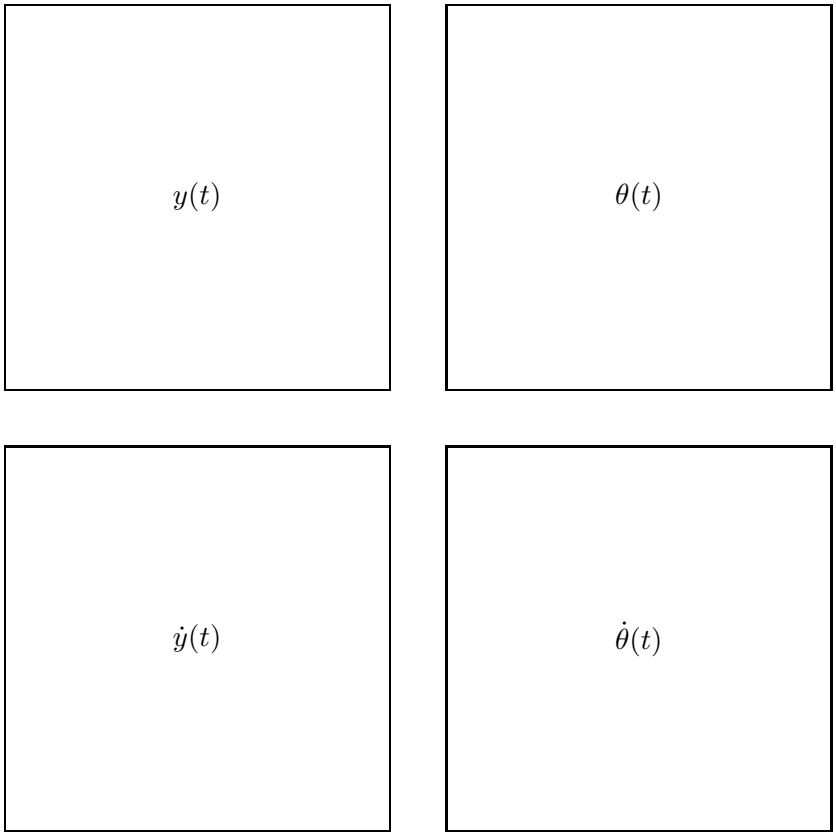
This section contains the response of the nonlinear system to the second pole placement controller with the observer. Plot the state and its estimation on the same axis.



Observer gain: $L = \ldots$
Observer poles:
Description:

5 Optimal Controller

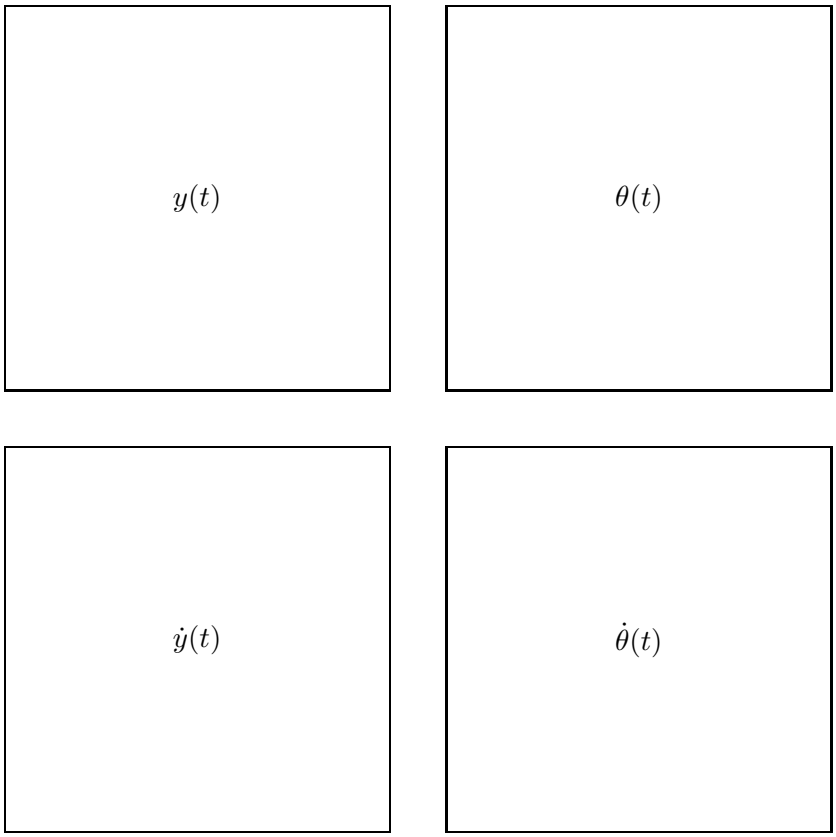
This section contains the response of the linear system to the optimal controllers for the three given sets of Q and R values. Plot the response for all three controllers on the same axis.



Controller gain 1: $K = \ldots$
Closed loop poles 1:
Controller gain 2: $K = \ldots$
Closed loop poles 2:
Controller gain 3: $K = \ldots$
Closed loop poles 3:
Description:

6 Increased Initial Angle

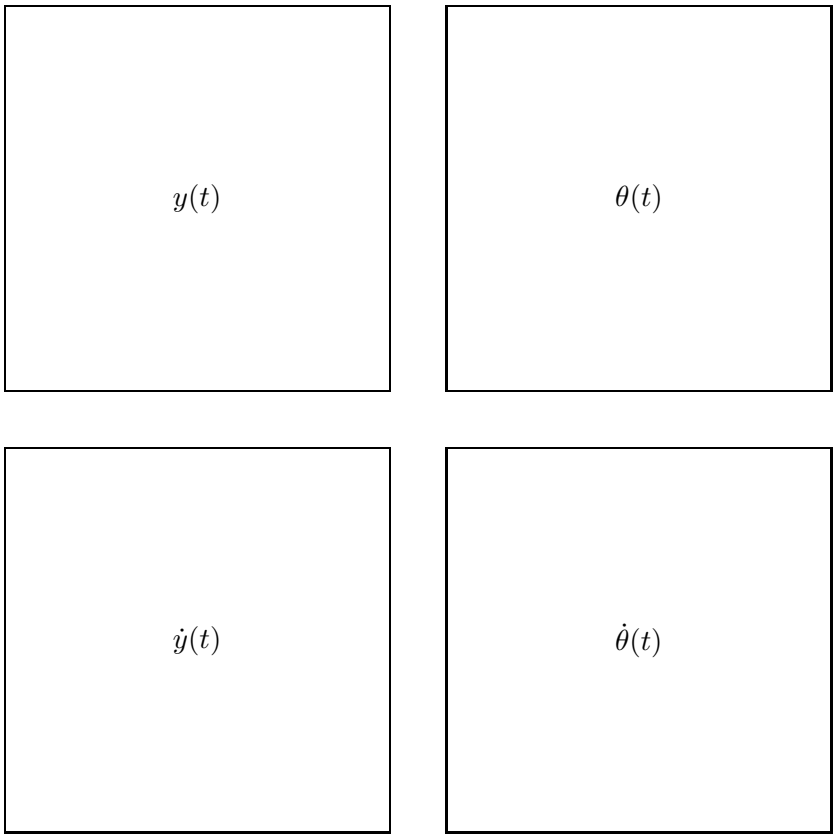
This section contains the response of both the linearized and nonlinear model OF_Controller_II and the new initial condition ($\theta = 30$ degrees). Plot both responses on the same axis.



Description:

7 Optimal Controller

This section contains the response of both the linearized and nonlinear model to the optimal controller for the given sets of Q and R. Plot both responses on the same axis.



Description:

8 Conclusion and Remarks