CALIFORNIA INSTITUTE OF TECHNOLOGY
Control and Dynamical Systems

CDS 110b

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Problem Set #1

Issued: 9 Jan
Due: 16 Jan, 4 pm

1. Consider the inverted pendulum dynamics as described in equation 1 in the posted class notes. Linearize the dynamics about both the up and down equilibria and design stabilizing controllers for $\tau = 0,\ l = 1$ and different lengths l_0, using **only** the techniques from CDS 110a. Let $l_0 = 1,\ l_0 = 0.75, l_0 = 0.5$ and the smallest l_0 you can come up with a stabilizing controller for. For each controller design, hand in a pole-zero plot and Bode plots and comment on gain and phase margins.