Name: _____ ID: _____

1.) (5 pts) Consider a lamp equipped with a dimmer in a room with one window. The objective is to maintain a constant level of brightness in the room. Identify the control inputs, the outputs, and the disturbances. Describe a control system to achieve the desired objective and identify whether your control system is open-loop or closed-loop.

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2.) (5 pts) Please draw block diagrams for:

(a) The controlled lamp described in Problem 1, and

(b) Water-level float regulator system discussed in Lecture 1.

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3.) (10 pts) Please solve Problem B-2-2 from Ogata (page 60).

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4.) (10 pts) Please solve Problem B-2-5 from Ogata (page 61). Please disregard the variable *s* in the given block diagram (e.g. $G_c(s) = G_c$, $G_p(s) = G_p$, etc).

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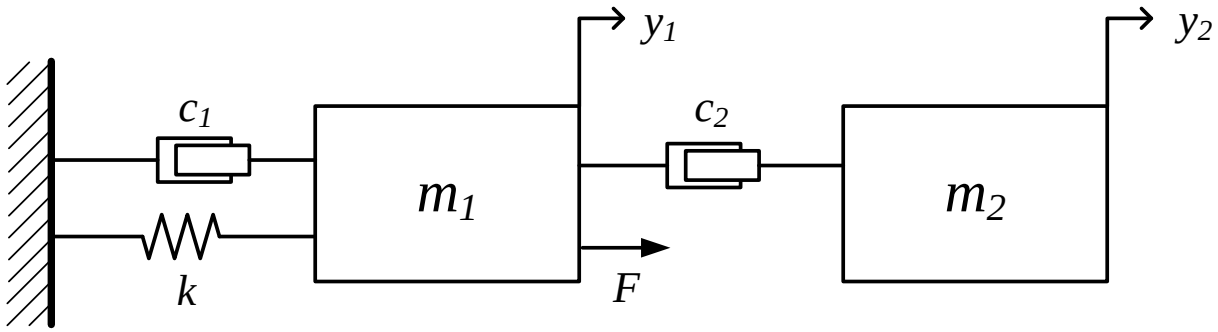
5.) Please consider the mechanical system shown in the figure below.

a) (10 pts) Find the differential equation(s) that model this system.

b) (10 pts) Identify state variables, and represent your model in the state-space form.



Name: _____ ID: _____

6.) (10 pts) Please solve Problem B-2-9 from Ogata (page 62).