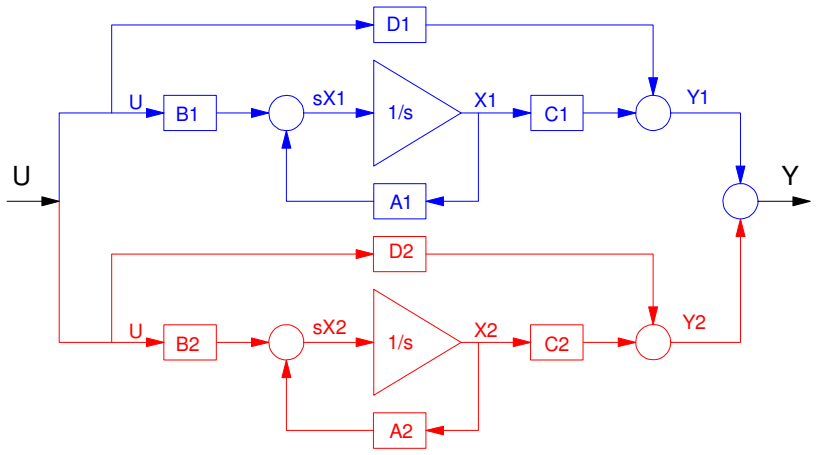
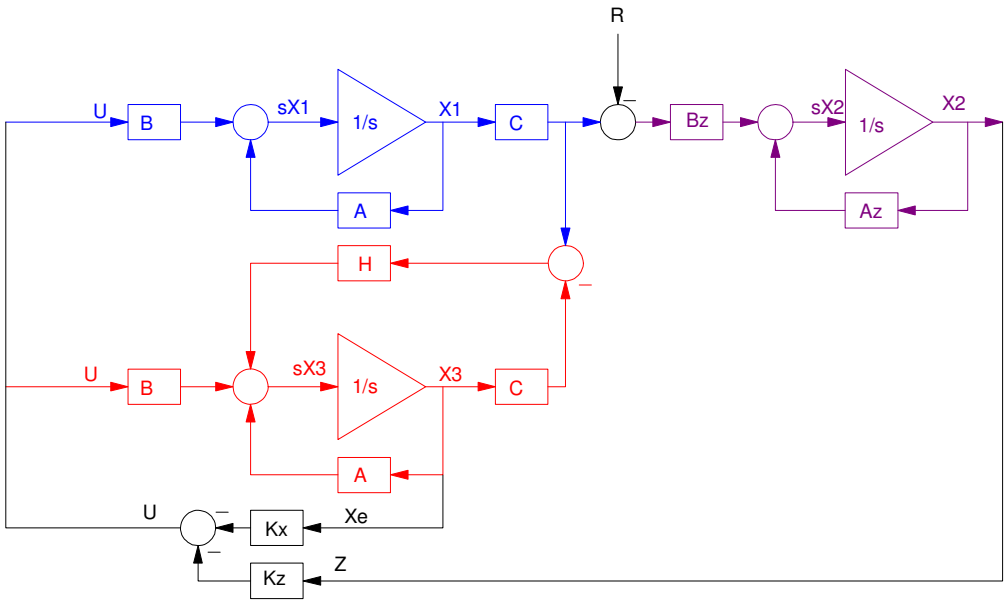
ECE 463/663 - Homework #4

Block Diagrams and LaGrangian Dynamics. Due Monday, February 8th

1) Determine the state-space model for two systems in parallel:



2) Determine the state-space model for the following system:

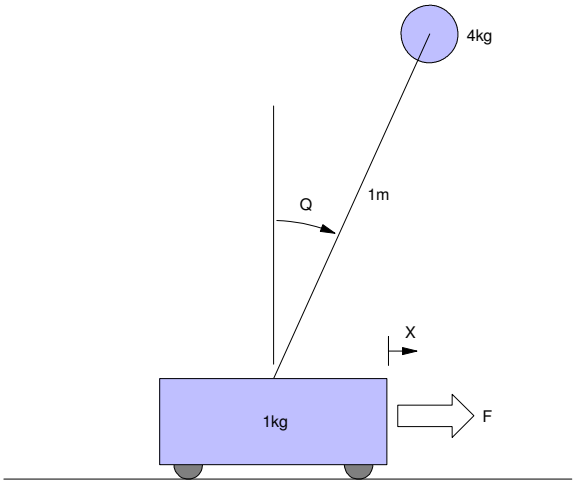


(over)

3) (30pt) Derive the dynamics for an inverted pendulum where

- m1 = 4kg (mass of ball)
- m2 = 1kg (mass of cart)
- L = 1.0m (length of arm)

Fine the linearized dynamics at x = 0, θ = 0



4) (30pt) Derive the dynamics for a ball and beam system where

- J = 2.0 kg m2 (the inertia of the beam)
- m = 0.5kg (the mass of the ball)

Find the linearized dynamics at r = 1.0m, θ = 0