ECE 463/663 - Homework #9

Calculus of Variations. Ricatti Equation. Due Wednesday, April 3rd
Please submit as a hard copy, email to jacob.glower@ndsu.edu, or submit on BlackBoard

Soap Film

1) Calculate the shape of a soap film connecting two rings around the X axis:
   - Y(0) = 6
   - Y(4) = 9

2) Calculate the shape of a soap film connecting two rings around the X axis:
   - Y(0) = 6
   - Y(2) = free

Hanging Chain

3) Calculate the shape of a hanging chain subject to the following constraints
   - Length of chain = 11 meters
   - Left Endpoint: (0,7)
   - Right Endpoint: (10,8)

Ricatti Equation

4) Find the function, x(t), which minimizes the following funcional

$$J = \int_0^{10} (4x^2 + 2\dot{x}^2)dt$$

x(0) = 5

x(10) = 6

5) Find the function, x(t), which minimizes the following funcional

$$J = \int_0^{10} (4x^2 + 2u^2)dt$$

$$\dot{x} = -0.1x + u$$

x(0) = 5

x(10) = 6