

Florida International University
Department of Civil and Environmental Engineering

Homework 1

Optimization in Water Resources Engineering, Spring 2020

Instructor: Arturo S. Leon, Ph.D., P.E., D.WRE

1. The storage volume for a proposed reservoir is given by the equation:

$$S = 10 A h$$

where **A** is the area of the reservoir site in acres, and **h** is the height of the dam in feet. The cost of the land is \$1000 per acre, and the cost of the dam is \$5000 per foot of height. The total budget for the project is \$200,000. Determine the optimal size for the reservoir area and dam height within the given project budget. As part of your report, (a) show the formulation and solution of the optimization problem, (b) perform a sensitivity analysis of the solution with respect to each of the variables of the optimization problem.

2. A farmer desires to maximize revenue from two crops (beans and potatoes). He estimates his net profit at \$100 per acre of beans and \$150 per acre of potatoes. He is limited to 10 acres of land and for labor or equipment reasons can plant no more than four acres of potatoes. Also, beans require two feet of irrigation water, potatoes require four feet, and his total dependable water supply is 24 acre feet. How many acres of beans and potatoes should be planted to maximize the net benefits subject to the constraints on land, water, and labor? As part of your report, (a) show the formulation and solution of the optimization problem, (b) perform a sensitivity analysis of the solution with respect to each of the variables of the optimization problem.