SYS 660
Assignment 4
Due: March 16, 2019

Name: _____

*All assignments should be either in pdf, word or excel and through Canvas. One file per assignment only. All files should have your name as well as page numbers (2 points each).*

*This is a basic decision making assignment. You would need to do some preliminary research and analysis to come up with the best answer. There is not one "right" answer. Whatever your answer is the analysis/method should be correct and the assumptions should be stated clearly for me to be able to follow your thoughts. Do NOT assume that I am a mind-reader; I am NOT!*

*Your writing skills are a key component of your grade on this assignment. Please take great care in writing, editing, and formatting before submitting it.*

*This is an open-ended assignment just as real-life decision making generally is. Any of the tools we have learned in this course thus far can be used for your analysis of this assignment.*

**Question 1:** How many pounds of toothpaste are used in the US each day? You would need to transfer all of this toothpaste to a certain location via 747 aircrafts. How many 747 aircrafts would it take to move it.

Your assumptions and calculations should be very clear to comprehend. If you are using any data from external sources do NOT forget to mention your source. What is your lower bound, upper bound and best guess for your estimates.

**Question 2:** You are trying to quantitatively estimate the impact of Stevens' commuters on roadway congestion in order to determine alternative bus routes to reduce the number of drivers. To do so, you will estimate the total number of miles traveled by people driving to campus on an average weekday, including all faculty, staff and students. Estimate the total number of miles driven, and report a range of values. You must source all the documents and/or websites you use to find data.

**Question 3:** Your company is considering the acquisition of a computer system for $22,000 for a five-year project. You may either buy the computer with borrowed money at 8%, with a single repayment at the end of 5 years, or lease it with yearly payments of $7500, $6500, $5500, $4500, and $3500 at the end of years 1 through 5. The salvage value is $2000, and the expected yearly benefits are $6000. Your corporate income tax rate is 50%, depreciation is by double declining balance, and discount rate is 8%.

a) Should you buy or lease?
b) Does your answer change if your discount rate is 5%? What if it is 15%?

**Question 4:** A benefit-cost study of a proposed dam is conducted. The dam costs $75 million to construct. The study estimates a stream of social benefits of $9.5 million per year (from avoided flood damage, hydroelectric power, etc.) and annual costs of $4 million ($2 million from operation and $2 million in environmental damages). Note: Feel free to use Excel/etc. on this problem.

a) Assuming a social marginal rate of time preference (i.e. social discount rate) of 4% per year, how many years does it take for the dam to "break even" (i.e., the NPV of benefits just exceed the NPV of costs)?

b) Opponents of the study disagree with using a single discount rate of 4% for all of the benefits and costs. They argue that the $2 million in environmental costs should only be discounted at 1%. Develop a graph of the NPV as a function of the years of operation – from 0 to 300 years – for this group of opponents. Assume all benefits and costs are $0 after the end of operation of the dam. In which year would the opponents be in favor of closing the dam facility, and why?