Exam 1

ISE 754: Logistics Engineering **Fall 2020**

Assigned: 12p, Tue, 6 Oct Due: 9p, Wed, 7 Oct

This exam consists of two problems that you should solve by yourself outside of class. The exam is open book, open notes, and open software. This is an individual exam and due consideration will be given to the fact that you are working on your own and thus will be producing original and unique work, not to mention the possibility that you might make several minor errors due to the pressure of working under a deadline. If the Instructor has determined that you have collaborated with anyone else on the exam, the few points that you might lose due to these types of minor errors will be far less than the penalty associated with the violation of academic integrity that you would receive.

Instructions:

For each problem, you should provide a concise summary that includes (a) a single paragraph describing your overall approach and final result, (b) justification of all significant assumptions, and (c) a verbal description of your procedure for solving each major non-standard step in your approach (you can just reference any standard approach covered in class without description). The summary will be the reviewed first when grading each problem. If you are not able to computationally solve the problem, then partial credit will be given if you describe a basically correct approach in your summary.

You should submit an electronic copy of your results via Moodle, including all text and Matlab files that you have created. Also, make sure you have installed the latest updates to Matlog; an email will be sent to notify you if any updates occur during the exam period.

Problem 1: 60 pts

The Engineering Division of the Orange County, NC, Planning and Inspections Department has been tasked with studying how to implement a residential reuse program to supplement and eventually replace a large portion of the county's existing recycling program. They are looking to establish reuse centers that are able to process both glass and plastic reusable containers, and have found a reuse center design that is able to process up to 80,000 pounds of glass and plastic per week. They have estimated that, after new restrictions on the use of disposable containers are in place, the per-capita reuse demand will be around four pounds per week, and they would like to know both how many centers they should establish and where in the county they should be located.

Problem 2: 40 pts

Each year, 720, 120, and 480 units of three different raw materials are to be shipped each year to a manufacturer in Austin, TX, from a supplier in Chicago, IL, who supplies similar materials to manufacturers all over the country. Each unit weighs 16, 150, and 40 lb, occupies two, six, and 12 ft^3, costs \$500, \$200, and \$100, and will have a salvage value after one year of \$50, \$180, and \$80, respectively. Assuming that the materials are used at a constant rate and that they will be transported via truck, determine, for each material, how it should be transported (TL, LTL, or as aggregate TL), how frequently it should be shipped, and how much should be transported in each shipment.