

Exam 2

ISE 754: Logistics Engineering

Spring 2019

Assigned: 3:45p, Wed, 17 Apr

Due: 9p, Thu, 18 Apr

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 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: 50 pts

A single product is produced in a single-stage production process. A 13-week rolling horizon is used for planning production. The process has a capacity of 60 tons per week. The estimated demand (in tons) over the horizon is provided in worksheet *P1-Demand* of spreadsheet *Exam2DataS19.xlsx* (see Course Schedule for data link). Data for the past year is provided in the worksheet *P1-Data*, where data for production (in ton/wk) and production cost (in \$000/wk) is listed for the weeks in which the process was operating. No historical data is available for inventory carrying costs. Currently, there is 13 tons of finished product in storage, and this same amount should be in inventory at the end of the planning period. There is enough space to store up to 120 tons of finished product, but it loses half its value after spending four weeks in storage. Determine the best production plan over the planning horizon.

Problem 2: 50 pts

Green Van Delivery, Inc., has hub in Chicago, IL. The location of the hub is provided in the worksheet *P2-DC* of spreadsheet *Exam2Data19.xlsx* (see Course Schedule for link), while the worksheet *P2-Customers* contains, for 50 customers that are to be served tomorrow between 8 AM and 5 PM, their location, and number of packages to be delivered. Each identical van is electric and can carry up to 40 packages and can travel 200 mi between charges. A full charge at the hub takes one hour and each van can assumed to be fully charged at the start of each day. Each delivery to a customer takes two minutes irrespective of the number of packages delivered. Most of the customers are at residential locations, and any differences in the physical weight and cube of the packages can be ignored. Determine the number of vans needed for tomorrow along with, for each route, its total distance, time, and the number of packages delivered.