EM384: Analytical Methods for Engineering Management
AT 23-2
Name:
Section :

Homework Set 4

This assignment is worth 20 points, and is due NLT 1700 the day of Lesson 15. Late submissions will be penalized 1 point (5% of the assignment) for each 24-hour period late after the due time - with assignments turned in more than 7 days late receiving 0 points.

- **Documentation**. This deliverable is an individual assignment. Any assistance received must be documented in detail. Document all sources in accordance with the Office of the Dean Pamphlet "Documentation of Academic Work," (June 2015), Appendix E, and course guidance. e-Acknowledge documentation must be turned in through CIS at the time of submission. The deliverable is considered late until all portions of the assignment and the documentation are submitted.
- **Turn-In Requirement**: You will turn in **two files** to microsoft Teams: **One PDF file** (this assignment with your responses filled in the blanks), and **one Excel file** (extension .xlxs) with your model for Problem 1, with the following naming convention:

  Section_LastName_FirstName_EM384_Homework_4

  Remember that engineering management is about communicating. You will be graded on the clarity and structure of your work.
- **Acknowledgement Statement**: This assignment must be accompanied by a signed e-Acknowledgement Statement (DAW) to be eligible for graded credit. If you submit your files(s) but fail to sign the e-Acknowledgement Statement, your assignment will be considered late until the e-Acknowledgement Statement is signed.
- **Guidelines for Documenting Assistance**: For this assignment, individual work is highly encouraged, but collaboration between individuals is allowed. ALL collaboration must be documented. Any discussion of this problem set with anyone other than an EM384 instructor requires documentation. Documentation must be specific and detail the topics discussed and actions taken.
- You must be very specific (which problem, what assistance, etc.) when explaining any assistance used in your documentation or you will be deducted at a higher penalty. Assistance *may* result in a deduction of points in accordance with a holistic assessment by your instructor.
- Sharing of electronic files via email or any other electronic means is strongly discouraged. Using, copying, or being dictated someone else's work will result in a greater point deduction.

1. **Model and Solve a Linear Program Using Excel Solver (10 Points)**

   The Teslarati Motor Company (TMC) produces four types of cars: a coupe, a sedan, a hatchback, and a hybrid. TMC also produces an SUV and a truck. Vendor capacities limit total production capacity to at most 1.2 million vehicles per year. Coupes, sedans, and hatchbacks are built together in a facility with a total annual capacity of 800,000 cars. Hybrids are built at their own facility with a production capacity of 300,000. The facility that produces SUVs and trucks has a capacity of 500,000. TMC's marketing strategy requires that hybrids must constitute at least 10% of the product mix for the four types of cars. The Corporate Average Fuel Economy (CAFE) standards in the Energy Policy and Conservation Act require an average fleet fuel economy of at least 25 mpg. The profit margins, market potential, and fuel efficiencies are summarized in the table below.

Type	**Profit** ($/vehicle)	**Demand** (in thousands)	**Fuel Economy** (mpg)
Coupe	300	500	15
Sedan	225	400	34
Hatchback	250	300	35
Hybrid	200	225	40
SUV	350	325	20
Truck	400	100	18

   (a) **(6 Points)** Construct a linear programming model using DOC in the space below (use additional pages as necessary):

(b) **(10 Points)** Construct a spreadsheet model in Excel to solve your linear program

(c) **(4 Points)** Solve your linear program and report the optimal decision variable values below, in addition to the optimal objective function value.

- Number of Coupes produced:
- Number of Sedans produced:
- Number of Hatchbacks produced:
- Number of Hybrids produced:
- Number of SUVs produced:
- Number of Trucks produced:
- Optimal Profit: