

Principles of Optimization (Fall 2024): Homework 2

- The total points (given in parentheses) add up to 90. You will be graded for 85 points (with the possibility of getting up to 5 points as extra credit).
 - **This homework is due at the start of class on Thursday, Sep 5.**
 - **Alternatively, you can submit your homework by email as follows:**
 - **You must email your submission as a PDF file to kbala@wsu.edu.** You are welcome to write answers by hand, and scan the writings (or take pictures of your writings) into a **PDF file**.
 - **Your file name should identify you in this manner: If you are Mark Costwolds, say, you should name your submission `MarkCostwolds_Math364_Hw2.pdf`. Please avoid white spaces in the file name (use “_” or “-” instead).**
 - **Begin the SUBJECT of your email submission with the same `FirstnameLastname`, expression, e.g., “`MarkCostwolds Math364 Hw2 submission`”.**
 - **This homework is due by 12:05 PM on Thursday, September 5, i.e., email me before start of the lecture.**
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1. (25) Chukees Toys makes two toys: Dirty Chukee and Ugly Chukee. Each toy goes through assembly and painting. If the assembly shop worked on only Dirty Chukees, 1,500 toys could be assembled in a day. Similarly, if it worked on only Ugly Chukees, 1,200 toys could be assembled. If the paint shop worked on only Dirty Chukees, 800 toys could be painted in one day. Similarly, if it worked only on Ugly Chukees, 700 toys could be painted in a day. Each Dirty Chukee and Ugly Chukee toy gives a profit of \$4 and \$3, respectively. Formulate an LP to maximize Chukees’ daily profit.
 2. (20) Solve graphically the alternative formulation of the Farmer Jones LP with the variables x_1, x_2 set as numbers of bushels of corn and wheat as discussed in Lecture 4). From the optimal solution of this LP, find the optimal solution of the original formulation of the Farmer Jones LP, which uses acres of corn and wheat as the variables (discussed in Lecture 3).
 3. (25) Gaseous Chemicals makes three chemicals A, B, and C, via two processes. Running Process 1 for an hour costs \$4, and yields 3, 1, and 1 units of A, B, and C, respectively. Running Process 2 for an hour costs \$1, and yields 1 unit of A and 1 unit of B. At least 10, 5, and 3 units of A, B, and C, respectively, must be produced in order to meet demand. Determine the daily production plan that minimizes the total daily cost for meeting the demands of Gaseous Chemicals using the graphical method to solve LPs.
 4. (20) State whether each statement is True or False. Justify your answer.
 - (a) Every LP with an unbounded feasible region is unbounded.
 - (b) There could be some unbounded LPs whose feasible region is bounded.