Principles of Optimization (Fall 2024): Homework 5

- The total points (given in parentheses) add up to 95. You will be graded for 90 points (with the possibility of getting up to 5 points as extra credit).
- **You must 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 Alphonse Mephesto, say, you should name your submission AlphonseMephesto_Math364_Hw5.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., "AlphonseMephesto Math364 Hw5 submission".**
  - **This homework is due by 5:00 PM on Thursday, September 26.**

1. (20) Convert the Killer Drugs Doozey LP (Problem 2 in Homework 3) to standard form. Use the formulation given in the solutions to Homework 3.

2. (25) Describe the correspondence between corner points and basic feasible solutions for the following LP. You should first plot the feasible region, clearly identifying the corner points. You should then identify the basic feasible solutions corresponding to each corner point. You could display the correspondence in a tabular form, as we did in Lecture 10.

$$\begin{array}{rcl} x_1 & \leq & 4 \\ x_1 + x_2 & \leq & 6 \\ 4x_1 + 2x_2 & \leq & 15 \\ x_1,\ x_2 & \geq & 0 \end{array}$$

3. (25) Solve the following LP using the simplex method.

$$\begin{array}{lrcl} \max\ z = & x_1 + x_2 & & \\ \text{s.t.} & 4x_1 + x_2 & \leq & 95 \\ & x_1 + x_2 & \leq & 65 \\ & x_1 & \leq & 30 \\ & x_1,\ x_2 & \geq & 0 \end{array}$$

4. (25) Solve the following LP using the simplex method.

$$\begin{array}{lrcl} \max\ z = & x_1 + x_2 + x_3 & & \\ \text{s.t.} & x_1 + 2x_2 + 2x_3 & \leq & 20 \\ & 2x_1 + x_2 + 2x_3 & \leq & 20 \\ & 2x_1 + 2x_2 + x_3 & \leq & 20 \\ & x_1,\ x_2,\ x_3 & \geq & 0 \end{array}$$