MATH 435 & 535: Homework #6

Due Wednesday, 2/28, by 11:59pm in Blackboard. Submit a PDF file through Blackboard Assignment.

You are allowed to discuss the homework problems with no one except your classmates, the TA, and the instructor. However, the solutions should be written by you and you alone in your own words. **If you discussed HW problems with a classmate or TA, you have to write their name at the top of the HW submission as a collaborator.** Any incident of plagiarism/ cheating (from a person or from any online resource) will be strictly dealt with.

Re-read the "HW Discussion and Solution Rules" and " 'Why and How' of Homework" sections of the course information sheet for some important advice on the HWs for this course.

All problems require explicit and detailed explanations. Solutions should be written clearly, legibly, and concisely, and will be graded for both mathematical correctness and presentation. Points will be deducted for sloppiness, incoherent or insufficient explanation, or for lack of supporting rationale.

Always remember that homework is NOT meant to be an examination, it is meant to assist in your learning and development. If you need help with any HW problem, don't hesitate to ask me. You are encouraged to ask questions during my *Office Hours*, during the *TA office hours*, or through *Email to me*.

Math 535: Submit all the following problems.
Math 435: Submit all the following problems.

Below 'BT x.y' refers to the corresponding exercise in the course textbook: D. Bertsimas and J. Tsitsiklis, *Introduction to Linear Optimization*, Athena Sc., 1997.

READ Examples 3.5 and 3.6 from BT, as well as the tableaux examples from class (see the lecture log), before attempting this HW.

1. BT 3.18ab

2. BT 3.12

3. Consider the following Simplex Tableau:

	0	-2	-3	1	12	0	0
x_5	0	-2	-9	1	9	1	0
x_6	0	$\frac{1}{3}$	1	$-\frac{1}{3}$	-2	0	1

Note that x_5 and x_6 are the current Basic variables.

(a) Apply the Simplex tableau method with the following pivoting rule:
The non-basic variable with the most negative cost enters the Basis, and

In case of ties for the leaving variable, choose the variable corresponding to the row that is higher up in the tableau.

Demonstrate that the Simplex method cycles (i.e., you get the exact same Tableau, and consequently the same Basis, after a few iterations).

(b) Apply the Simplex method with Bland's rule and demonstrate that the Simplex method does not cycle by finding the optimal solution.

4. BT 3.19 (in part (a), they are really asking for multiple optimal bases and not multiple optimal solutions). You have to explain what conditions are required for the parameter values in each part.