## University of Toronto at Scarborough Department of Computer & Mathematical Sciences

## MATA33S Assignment 1 (2 pages) Winter 2018

Work on the course material and problems below.

Tutorial Quiz 1 is based on this assignment, the relevant text readings, and lecture notes. You should expect that Tutorial Quiz 1 may also cover material from Assignment 2. Tutorial Quiz 1 will be in Week 3 (Fri Jan 19 - Thurs Jan 25).

Study: Sections 7.1 - 7.3 are covered in this assignment.

**Terminology and Concepts to Learn:** linear inequalities, graphical solution to linear inequalities, solving a system of linear inequalities, feasible points (or set or region), shading the planar points not in the feasible region, corner points, objective function, nonnegativity conditions, bounded/unbounded/non-empty/standard feasible region (feasible set), Fundamental Theorem of Linear Programming (FTLP), level curve, multiple optimum solutions.

## Problems:

- 1. Section 7.1, Page 298 # 1, 3, 5 8, 10 12, 17, 18, 22, 25 29.
- 2. Section 7.2, Pages 305 306 # 1 7, 10.
- 3. Minimize (if possible) the objective function Z = y x subject to the constraints (i.e. set of linear inequalities):  $x \ge 3$ ,  $x + 3y \ge 6$ ,  $x 3y \ge -6$ ,  $x, y \ge 0$
- 4. Section 7.2, Pages 306 307 # 13, 14, 17, 18, 21.
- 5. Section 7.3, Page 309 # 1, 2 (note one of the constraints is an equation), 3, 4 (For # 4, in addition to the text hint, it may also be useful to draw the four corners of a square and label them A, B, C, and D (for the four cities). Then put in a directed edge between those cities where there is a "flow of cars". For example, you will have a directed edge from C to A labeled x because x is the number of cars delivered from Concord to Atherton. The cost function to be minimized is actually not linear, but you can deal solve the "linear part" using FTLP and then add in the constant term.)

## Notes/Reminders/Corrections:

- 1. Solutions to many odd-numbered problems are in our textbook. Solutions to even-numbered problems and extra problems will be posted at our web site.
- 2. In MATA33S, we shade the "anti-region". That is, we shade that portion of the plane that is not the feasible region. See Page 296.
- 3. Recall that you cannot use any kind of calculator or other electronic device during the writing of any tutorial quiz, the midterm test, or final exam.

- 4. The prerequisite for MATA33S is MATA32 (or approved equivalent course). You cannot take MATA33S and its prerequisite together in this winter term. If you are taking MATA33S now and you have not passed MATA32 (or an approved equivalent), you will be removed from MATA33S.
- 5. On Page 307, # 21(b), the second inequality should be  $x + y \ge 200$ .
- 6. You can only write a quiz in the tutorial you are officially registered in. If you write a quiz in a tutorial you are not officially registered in, the TA for that tutorial will record a score of 0 for that quiz.