University of Toronto at Scarborough
Department of Computer & Mathematical Sciences

MATA33S **Assignment 2 (2 Pages)** **Winter 2018**

Work on the course material and problems below.

Tutorial Quiz 1 takes place in your tutorial in Week 3 (Friday Jan 19 - Thursday Jan 25). It will cover only text material Sections 7.1 - 7.3, all of Assignment 1, and only Problems 8, 9, 10 from this Assignment 2, and associated lecture notes. There will not be any Quiz 1 questions dealing with matrices or matrix algebra (i.e. Text Sections 6.1 - 6.3 and Problems 1 - 7 below are not on Quiz 1).

Study: Review sections 7.1-7.3 as necessary and begin to study sections 6.1-6.3. Read ahead in sections 6.4 and 6.5 for upcoming lectures and the next assignment.

Terminology and Concepts to Learn in Chapter 6: Matrices and notation, equality of matrices, transpose, diagonal and triangular matrices, matrix arithmetic (i.e. addition, subtraction, scalar multiplication, matrix multiplication) and properties, identity and zero matrix, matrix equations, representing and manipulating data and information using matrices.

Problems:

1. Section 6.1 # 1 - 12, 14, 17 - 28.
2. Section 6.2 # 1 - 10, 14 - 20, 29 - 33, 35 - 39, 42, 43.
3. Section 6.3 # 1 - 10, 19 - 23, 26, 33, 34, 38, 45, 46, 48, 57 - 61, 64, 66, 68.
4. Give an example of 2×2 matrices A and B such that $A^2 - B^2 \neq (A - B)(A + B)$.
5. Give an example of non-zero 2×2 matrices A, B and C such that:
   (a) $AB = AC$ but $B \neq C$ (b) $AB = 0$
6. Let $A = \begin{bmatrix} 2 & 5 \\ 3 & 9 \end{bmatrix}$ and $B = \begin{bmatrix} 6 & -55 \\ -33 & 4 \end{bmatrix}$
   Find: (a) $(A - 2I)^T$ and (b) all 2×2 diagonal matrices D such that $D^2 - A^2 = B$.
7. Find four different matrices each of whose square is the 2×2 identity matrix.
8. Let R be the region in the plane with corner points $(0, 0)$, $(0, 6)$, $(4, 8)$, $(10, 2)$ and $(6, 0)$ (assume R also contains the edges determined by these vertices). Find five linear inequalities whose solution set is the region R.
9. Suppose a region R has corner points $A = (-2, 1)$, $B = (0, 4)$, $C = (3, 2)$ and $D = (1, 0)$. If $r > 0$ is a constant, show that every objective function of the form $g(x, y) = Z = rx + 3ry$ is minimized at all points on the line segment $\overline{AD}$ and maximized at B.
10. Use the methods and ideas in sections 7.1-7.3 (and not the "simplex method") to solve:
    (a) Page 321 # 5 and (b) Page 337 # 11.

Notes:

1. Some of the problems on a current assignment may focus on material from a previous assignment. This is intentional and will help you review and strengthen your knowledge and facility with concepts throughout the course.
2. You can only write a tutorial quiz in the tutorial you are officially registered in. If you do otherwise, your score is 0 on that quiz.