KFUPM, DEPARTMENT OF MATHEMATICS AND STATISTICS

MATH 225: TEST 1, SEMESTER (181), SEPTEMBER 30, 2018

Time: 18:00 to 19:00

Name : ....

ID : ..... Section : .....

Exercise	**Points**
1	_____ 12
2	_____ 12
3	_____ 12
4	_____ 12
5	_____ 12
Total	_____ 60

Exercise 1. Use back substitution to solve the linear system whose augmented matrix is given by

$$\left(\begin{array}{ccc|c} 1 & 1 & 2 & 1 \\ 0 & 2 & -1 & -1 \\ 0 & 0 & 3 & 6 \end{array}\right)$$

Exercise 2. Consider the matrix

$$A = \begin{pmatrix} 1 & 1 & 2 \\ 2 & 5 & a \\ -1 & 1 & b \end{pmatrix}$$

For what values of a and b will the system $AX = O$ have infinitely many solutions?

Exercise 3. Consider the system $AX = B$, where

$$A = \begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}, \; B = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$$

Solve the system by transforming the corresponding augmented matrix to the reduced row echelon form.

Exercise 4. Let A be an $n \times n$-matrix such that $A^2 = A - I$.

(**a**) Find A^p, for $p = 0, 1, 2, 3, 4, 5, 6$.

(**b**) Find A^p, for each positive integer p..

(**c**) Show that A is invertible and write A^{-1} as a function of A.

Exercise 5. Let A be the matrix given by

$$\begin{pmatrix} 3 & 1 \\ 2 & 1 \end{pmatrix}$$

Using elementary row operations, find A^{-1} and express A as a product of elementary matrices.