ABI BEKR BELKAID UNIVERSITY
Faculty of Economics, Business and Management Sciences
Département of financial sciences

1st year FILA
Mathématics 1

Matrix Worksheet 02

Exercise 01 In each case assume that A is a square matrix that satisfies the given condition. Show that A is invertible and find a formula for A^{-1} in terms of A.

a. $A^3 - 3A + 2I = 0.$

b. $A^4 + 2A^3 - A - 4I = 0.$

Exercise 02: : Let A be a matrix

$$A = \begin{pmatrix} 1 & -1 \\ 0 & 2 \end{pmatrix}$$

1. Verify that $A^2 - 3A + 2I = 0$.
2. Deduce that A is inversible and determine A^{-1}

Exercise 03 : Let M be a 2x2 square matrix:

$$M = \begin{pmatrix} 0 & -1 \\ 1 & -1 \end{pmatrix}$$

1. Determine the matrices : $M^2 and\ M^3$?
2. Has M an inversible matrix ? if it is yes, find M^{-1}

Exercise 04 : For the following matrices, perform a test for invertibility and, if possible, compute the inverse matrix.

$$A = \begin{pmatrix} -5 & 7 \\ 8 & 10 \end{pmatrix} \quad \mathrm{B} = \begin{pmatrix} 2 & -2 \\ 0 & 1 \\ 3 & -6 \end{pmatrix} \quad \mathrm{C} = \begin{pmatrix} -1 & -4 \\ 1 & -2 \end{pmatrix} \quad \mathrm{D} = \begin{pmatrix} 3 & 4 \\ 1 & 9 \end{pmatrix} \quad N = \begin{pmatrix} 2 & 4 \\ 1 & 2 \end{pmatrix}$$

$$\mathrm{E} = \begin{pmatrix} 0 & 0 & 2 \\ 3 & 1 & -1 \\ 2 & 2 & 4 \end{pmatrix} \quad F = \begin{pmatrix} -1 & -1 & 2 \\ 0 & 2 & 2 \\ -3 & 2 & 5 \end{pmatrix} \quad M = \begin{pmatrix} 3 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 4 \end{pmatrix} \quad G = \begin{pmatrix} 4 & 2 & 5 \\ 0 & 2 & 1 \\ 0 & 0 & 0 \end{pmatrix}$$

Exercice 05 : let $\boldsymbol{a}$ be a non nul real and N a matrix

$$N = \begin{pmatrix} 2+a & 4 \\ 1+a & 3 \end{pmatrix}$$

1. Give the values of a real a such as N must be an inversible
2. Find the invertible matrix N^{-1} when $a = 1$, $a = 2$ and $a = -3$