

**TEST 3**

1. Find the **inverse** of  $M$  [10 marks]:

$$M = \begin{bmatrix} -1 & 2 & 0 & 0 \\ 2 & -5 & 2 & 0 \\ 0 & -2 & 1 & -2 \\ 0 & 0 & -1 & -1 \end{bmatrix}$$

2. Find the **determinant** of  $N$  [10 marks]:

$$N = \begin{bmatrix} 1 & -2 & 0 & 1 & 4 \\ 0 & 0 & 3 & 0 & 0 \\ -2 & 1 & 6 & 4 & 0 \\ -2 & 4 & 1 & -1 & -6 \\ 0 & 2 & 3 & 0 & -2 \end{bmatrix}$$

3. Consider the system of equations represented as the **matrix equation**,  $A\vec{x} = \vec{b}$  [12 marks].

- (a) Use the method of inverses to solve the system of equations, and clearly show your answer:

$$\begin{aligned} 5x - 2y &= 1 \\ -4x + 2y &= 2 \end{aligned}$$

- (b) If  $A^{-1} = \begin{bmatrix} 1 & 4 & -1 \\ 2 & 0 & 3 \\ 7 & 2 & 1 \end{bmatrix}$ , and  $\vec{b} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ , then evaluate  $\vec{x}$ . Clearly show your answer.

- (c) If  $A^{-1} = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}$ , and  $\vec{b} = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$ , then what is the **ORIGINAL** system of equations?