

MATH6040: Sample Test 1

Name:

Student Number:

Answer all questions. Marks may be lost if necessary work is not clearly shown.

Useful Formula: $A^{-1} = \begin{pmatrix} a & b \\ c & d \end{pmatrix}^{-1} = \frac{1}{\det A} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$ where $\det A = ad - bc$.

1. For the matrices

$$D = \begin{pmatrix} -2 & 1 & 2 \\ 3 & -4 & 1 \end{pmatrix}; E = \begin{pmatrix} 1 & -2 & 0 \\ -3 & 2 & 0 \end{pmatrix}; F = \begin{pmatrix} 4 & 3 \\ 2 & -1 \\ 3 & 5 \end{pmatrix}$$

Determine each of the following, if defined:

- (a) $D + E$
- (b) $D + F$
- (c) $(D + E)^T$
- (d) FD

2. Given the matrices

$$A = \begin{pmatrix} 1 & -2 \\ 3 & 5 \end{pmatrix}; C = \begin{pmatrix} 12 & 22 \\ 16 & 24 \end{pmatrix}$$

Determine the matrix X such that $XA = C$.

3. Find the values of t for which the determinant of the matrix

$$\begin{bmatrix} 1 & t+3 \\ 3t & -6 \end{bmatrix}$$

is equal to zero.

4. Obtain the inverse of the matrix

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

Use this to solve the system of equations

$$\begin{aligned} 2x - y &= 3 \\ -x + 2y - z &= -8 \\ -y + 2z &= 9 \end{aligned}$$

Use Cramer's Rule to verify the answer for y .

Roughwork