

## Math 20480 – Example Set 02A

**1a.** Use Gaussian elimination to find the inverse of the following matrix:

$$A = \begin{pmatrix} 2 & 3 & -5 \\ -3 & 1 & 4 \\ 5 & -4 & 6 \end{pmatrix}$$

**1b.** Using your answer in (a), find the solution of the system of equations:

$$\begin{aligned} 2x + 3y - 5z &= 1 \\ -3x + y + 4z &= 0 \\ 5x - 4y + 6z &= -1 \end{aligned}$$

**2a.** Find a formula for the inverse of a  $2 \times 2$  (non-singular) matrix.

$$\boxed{\begin{pmatrix} a & b \\ c & d \end{pmatrix} =}$$

**2b.** Define the determinant of a  $2 \times 2$  matrix and explain its significance in solving a system of linear equations with two variables.

Math 20480 – Example Set 02B

1. Find the determinant of the following matrices:

a.  $\begin{pmatrix} 3 & 5 \\ 5 & -1 \end{pmatrix}$

b.  $\begin{pmatrix} 1 & 1 & 2 \\ 1 & -2 & -1 \\ 1 & -1 & 1 \end{pmatrix}$

c.  $\begin{pmatrix} 1 & -2 & -1 & 3 \\ -1 & 2 & 0 & -1 \\ 0 & 1 & -2 & 2 \\ 3 & -1 & 2 & -3 \end{pmatrix}$

2. Without solving explicitly, determine if the following systems of equations have a **unique** solution.

a.

$$\begin{aligned} x + y + 2z &= 8 \\ x - 2y - z &= -1 \\ x - y + z &= 4 \end{aligned}$$

b.

$$\begin{aligned} x + y - 2z &= 3 \\ -2x + z &= -3 \\ -5x + y + z &= -6 \end{aligned}$$