

Math Camp  
**Homework 8**

(1) Let  $A$ ,  $B$  and  $C$  be defined by

$$A = \begin{pmatrix} 2 & 0 \\ 3 & 1 \\ -1 & 4 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{pmatrix}, \quad C = \begin{pmatrix} 0 & 2 \\ 1 & 4 \end{pmatrix}.$$

Compute each of the following matrix products if possible. (Some are not possible.)

$$AB, BA, AC, CA, BC, \text{ and } CB$$

(2) Find all solutions to each system of equations by Gaussian elimination.

(a)

$$\begin{aligned} x_1 + x_2 + x_3 &= 7 \\ 2x_1 - x_2 - x_3 &= -4 \\ 2x_1 - 2x_3 &= -2 \end{aligned}$$

(b)

$$\begin{pmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 2 & 1 \\ 1 & 1 & 1 & 0 \end{pmatrix} \begin{pmatrix} a \\ b \\ c \\ d \end{pmatrix} = \begin{pmatrix} 3 \\ 8 \\ 5 \end{pmatrix}$$

(c)

$$\begin{pmatrix} 5 & 1 \\ 1 & 2 \\ 3 & 4 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 6 \\ 3 \\ 0 \end{pmatrix}$$

(3) Compute the determinant of the matrix  $\begin{pmatrix} 1 & -2 & 2 & 4 \\ 1 & 1 & 3 & 2 \\ 0 & 2 & 0 & -1 \\ 0 & 1 & 0 & 2 \end{pmatrix}$ .

(4) Find the inverse of the matrix  $A = \begin{pmatrix} 5 & 3 & 4 \\ 3 & 2 & 3 \\ 1 & 0 & 0 \end{pmatrix}$ . Then use  $A^{-1}$  to solve the systems

$$Ax = \begin{pmatrix} 3 \\ 2 \\ 1 \end{pmatrix} \text{ and } Ax = \begin{pmatrix} 0 \\ -1 \\ 5 \end{pmatrix}$$