

Exam 1

Linear Algebra, Dave Bayer, February 15, 2001

Name: _____

ID: _____ School: _____

| [1] (6 pts) | [2] (6 pts) | [3] (6 pts) | [4] (6 pts) | [5] (6 pts) | TOTAL |
|-------------|-------------|-------------|-------------|-------------|-------|
| | | | | | |

Please work only one problem per page, starting with the pages provided, and number all continuations clearly. Only work which can be found in this way will be graded.

Please do not use calculators or decimal notation.

[1] Solve the following system of equations:

$$\begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 3 & 6 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ 7 \\ 11 \end{bmatrix}$$

Problem: _____

[2] Express the following matrix as a product of elementary matrices:

$$\begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 2 & 2 \end{bmatrix}$$

Problem: _____

[3] Find the determinant of the matrix

$$\begin{bmatrix} 2 & 1 & 1 & 1 \\ 1 & 2 & 1 & 1 \\ 0 & 0 & 2 & 1 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

What can you say about the determinant of the $n \times n$ matrix (n even) with the same pattern?

Problem: _____

[4] Solve the following system of equations:

$$\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ -1 & -1 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} a \\ b \\ c \end{bmatrix}$$

Problem: _____

[5] Give a formula for the matrix which is inverse to:

$$\begin{bmatrix} \lambda & 1 & 1 \\ 0 & \lambda & 1 \\ 0 & 0 & \lambda \end{bmatrix}$$

Problem: _____