

## 3.3 Exercises

**Problem 1** Find the reduced echelon form of the following matrix

$$\begin{bmatrix} 1 & 3 & 15 & 7 \\ 2 & 4 & 22 & 8 \\ 2 & 7 & 34 & 17 \end{bmatrix}.$$

---

**Problem 2** Use the method of Gauss-Jordan elimination (reduced echelon form) to determine how

many solutions the system has.

$$\begin{bmatrix} 2 & 2 & 4 & 2 \\ 1 & -1 & -4 & 3 \\ 2 & 7 & 19 & 7 \end{bmatrix}$$

**Problem 3** Consider a homogeneous (what's this?) system of three equations in three unknowns. Suppose the third equation is the sum of a multiple of the first equation and a multiple of the second equation. Show that the system has a nontrivial solution (what's this?).

---

**Problem 4** Show that the  $2 \times 2$  matrix:  $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$  is row equivalent to the  $2 \times 2$  identity matrix, provided that  $ad - bc \neq 0$ . Observe that the identity matrix is  $\mathbf{I} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ .

**HINTS:** For them to be row equivalent, we need to be able to transform one into the other. Try to do row operations on  $\mathbf{A}$ , to get it into some form which looks like  $\mathbf{I}$ . Observe what restrictions on  $a, b, c, d$  arise as you do this (do not divide by zero!).