Linear Algebra 1: Tutorial 2

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Exercise 1. *Find the reduced row echelon form of the following matrices. What are the pivot columns and the pivot positions of these matrices?*

(a) $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 4 & 5 & 6 & 7 \\ 6 & 7 & 8 & 9 \end{bmatrix}$, *with entries understood to be in $\mathbb{R}$;*

(b) $\begin{bmatrix} 1 & 3 & 5 & 7 \\ 3 & 5 & 7 & 9 \\ 5 & 7 & 9 & 1 \end{bmatrix}$, *with entries understood to be in $\mathbb{R}$;*

(c) $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 1 & 1 \\ 0 & 1 & 1 \end{bmatrix}$, *with entries understood to be in $\mathbb{Z}_2$;*

(d) $\begin{bmatrix} 2 & 1 & 2 & 0 & 1 \\ 0 & 1 & 1 & 0 & 2 \\ 2 & 2 & 0 & 0 & 0 \\ 2 & 0 & 1 & 0 & 2 \\ 1 & 2 & 1 & 2 & 1 \end{bmatrix}$, *with entries understood to be in $\mathbb{Z}_3$;*

(e) $\begin{bmatrix} 2 & 4 & 2 \\ 1 & 4 & 3 \\ 4 & 4 & 0 \end{bmatrix}$, *with entries understood to be in $\mathbb{Z}_5$.*