Linear Algebra 2.2 Participation Problem

Michael Brodskiy
Instructor: Prof. Knight

February 10, 2021

Solve for a, b, c, and d in the following matrix equation:

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} 2 & 1 \\ 3 & 1 \end{bmatrix} = \begin{bmatrix} 3 & 17 \\ 4 & -1 \end{bmatrix}$$

$$\begin{aligned} 2a + 3b &= 3 \quad a + b = 17 \\ 2c + 3d &= 4 \quad c + d = -1 \end{aligned}$$

$$\begin{bmatrix} 2 & 3 & 0 & 0 & 3 \\ 1 & 1 & 0 & 0 & 17 \\ 0 & 0 & 2 & 3 & 4 \\ 0 & 0 & 1 & 1 & -1 \end{bmatrix}$$

$R_1 - R_2 \to R_1$ and $R_3 - R_4 \to R_3$

$$\begin{bmatrix} 1 & 2 & 0 & 0 & -14 \\ 1 & 1 & 0 & 0 & 17 \\ 0 & 0 & 1 & 2 & 5 \\ 0 & 0 & 1 & 1 & -1 \end{bmatrix} \tag{1}$$

$R_1 - R_2 \to R_2$ and $R_3 - R_4 \to R_4$

$$\begin{bmatrix} 1 & 2 & 0 & 0 & -14 \\ 0 & 1 & 0 & 0 & -31 \\ 0 & 0 & 1 & 2 & 5 \\ 0 & 0 & 0 & 1 & 6 \end{bmatrix}$$

$$\begin{aligned} a + 2b &= -14 \\ b &= -31 \\ c + 2d &= 5 \\ d &= 6 \\ a &= 48 \\ c &= -7 \end{aligned}$$