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MTH 317: Linear Algebra
Professor Sussan
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Homework #2 - 2.15 & 2.18(a)

✓ **2.15** Find the indicated entry of the matrix, if it is defined.

$$A = \begin{pmatrix} 1 & 3 & 1 \\ 2 & -1 & 4 \end{pmatrix}$$

(a) $a_{2,1}$ (b) $a_{1,2}$ (c) $a_{2,2}$ (d) $a_{3,1}$

(a) $a_{2,1} = 2$
(b) $a_{1,2} = 3$
(c) $a_{2,2} = -2$
(d) $a_{3,1}$ = undefined

✓ **2.18** Solve each system using matrix notation. Express the solution using vectors.

(a) $3x + 6y = 18$
$x + 2y = 6$

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$x+2y=6$

$$\left[\begin{array}{cc|c} 3 & 6 & 18 \\ 1 & 2 & 6 \end{array}\right] \xrightarrow{\frac{1}{3}R_1 \to R_1} \left[\begin{array}{cc|c} 1 & 2 & 6 \\ 1 & 2 & 6 \end{array}\right] \xrightarrow{R_2 - R_1 \to R_2} \left[\begin{array}{cc|c} 1 & 2 & 6 \\ 0 & 0 & 0 \end{array}\right]$$

$x + 2y = 6$
$x = 6 - 2t$
$y = t$

$$\begin{bmatrix} x \\ y \end{bmatrix} \begin{bmatrix} 6 - 2t \\ t \end{bmatrix} \rightarrow \begin{bmatrix} 6 \\ 0 \end{bmatrix} + t \cdot \begin{bmatrix} -2 \\ 1 \end{bmatrix} \quad \text{OR} \quad \left\{ \begin{pmatrix} 6 \\ 0 \end{pmatrix} + \begin{pmatrix} -2 \\ 1 \end{pmatrix} y \mid y \in \mathbb{R} \right\}$$