Applied Linear Algebra

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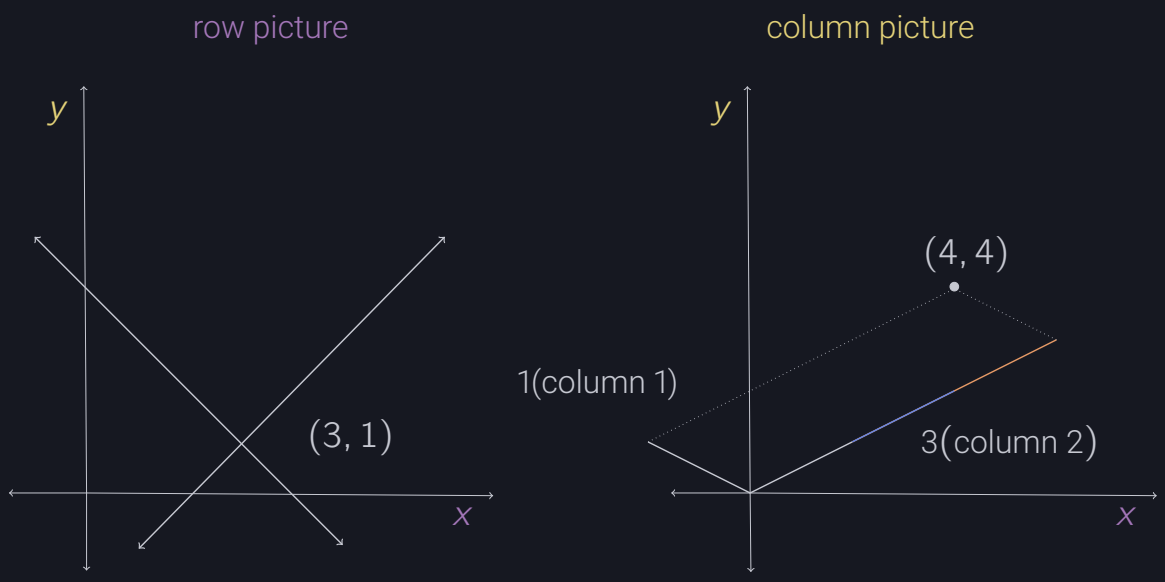
1 Matrices and Gaussian Elimination

1.2 The Geometry of Linear Equations

Problems 1–12

1. For the equations $x + y = 4,\ 2x - 2y = 4$, draw the row picture (two intersecting lines) and the column picture (combination of two columns equal to the column vector (4,4) on the right side).



1.2.1

2. Solve to find a combination of the columns that equals b:

$$\begin{aligned} u - v - w &= b_1 \\ v + w &= b_2 \\ w &= b_3 \end{aligned}$$

3. Describe the intersection of the three planes $u + v + w + z = 6$ and $u + w + z = 4$ and $u + w = 2$ (all in four-dimensional space).
   - Is it a line or a point or an empty set?
   - What is the intersection if the fourth plane $u = 1$ is included?
   - Find a fourth equation that leaves us with no solution.

Problems 13–15

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Problems 16–23

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1.4 Matrix Notation and Matrix Multiplication

1.5 Triangular Factors and Row Exchanges

1.6 Inverses and Transposes

1.7 Special Matrices and Applications

1 Review