

A n x n

$$\begin{pmatrix} a_{11} \\ \vdots \\ a_{1n} \\ \vdots \\ a_{n1} \\ \vdots \\ a_{nn} \end{pmatrix} = A$$

B

$$= \begin{pmatrix} a_{11} & & & \\ & a_{ii} & & \\ & & a_{jj} & \\ & & & a_{nn} \end{pmatrix}$$

$$\det B = 0$$

$$\sum_{j=1}^n a_{ij} a_{ji} = 0 \quad i \neq j$$

$$\sum_{j=1}^n a_{ij} a_{ji} = 0 = \det B$$

$$(a_{i1} \dots a_{in}) \cdot \begin{pmatrix} a_{11} \\ \vdots \\ a_{1n} \\ \vdots \\ a_{n1} \\ \vdots \\ a_{nn} \end{pmatrix} = 0$$

$$\underline{i=j} (a_{i1} \dots a_{in}) \begin{pmatrix} a_{11} \\ \vdots \\ a_{1n} \\ \vdots \\ a_{in} \\ \vdots \\ a_{nn} \end{pmatrix} = A$$

$$A \cdot \tilde{A}^T = \begin{pmatrix} |A| & & & \\ & \ddots & & \\ & & 0 & \\ & & & \ddots \\ & & & & |A| \end{pmatrix}$$

$$= |A| \cdot I_n$$

$$A \cdot \frac{\tilde{A}^T}{|A|} = I_n \quad A^{-1} = \frac{\tilde{A}^T}{|A|}$$

$$A \cdot x = b$$

$$x = A^{-1} b = \frac{A^{-1} b}{|A|}$$

$$\begin{pmatrix} x_1 \\ \vdots \\ x_n \end{pmatrix} = \frac{\det(A^{-1})}{|A|} = \begin{pmatrix} a_{11} \\ \vdots \\ a_{n1} \end{pmatrix}$$

$$x_i = \frac{\det(A_i)}{|A|} = \frac{\det \begin{pmatrix} b_1 & \dots & a_{1i} & \dots & a_{1n} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ a_{ni} & \dots & a_{nn} \end{pmatrix}}{|A|}$$

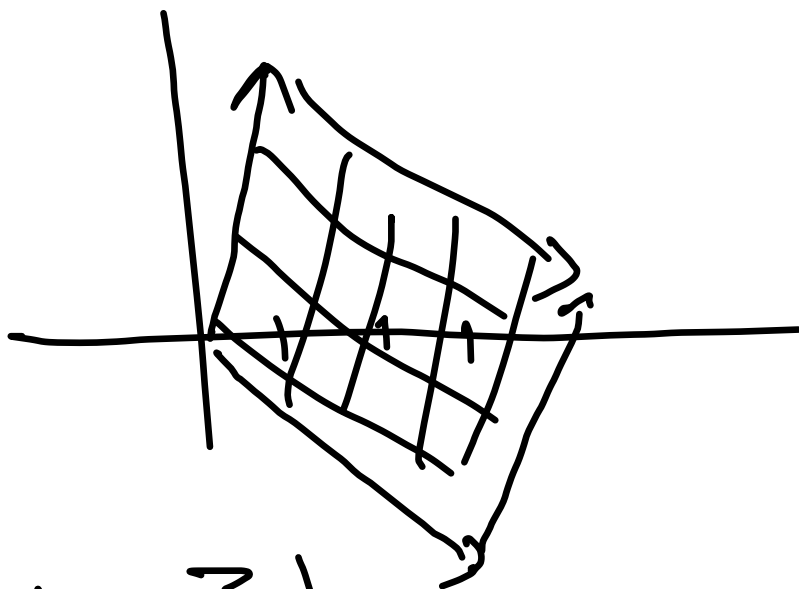
Handwritten mathematical work showing several stages of a calculation, likely a long division or a sequence of operations. The work is organized into columns and rows, with various numbers and symbols (including circled numbers and arrows) indicating the steps.

The work is divided into several sections:

- Top Left:** A vertical line above a horizontal line, with "11" written to the left. Below this, the numbers "3 2 1 0" are written vertically, followed by "3 2 1 0" and "1 0 1 2".
- Top Right:** A vertical line above a horizontal line, with "11" written to the left. Below this, the numbers "3 2 1 0" are written vertically, followed by "3 2 1 0" and "1 0 1 2".
- Middle Left:** A vertical line above a horizontal line, with "11" written to the left. Below this, the numbers "3 2 1 0" are written vertically, followed by "3 2 1 0" and "1 0 1 2".
- Middle Right:** A vertical line above a horizontal line, with "11" written to the left. Below this, the numbers "3 2 1 0" are written vertically, followed by "3 2 1 0" and "1 0 1 2".
- Bottom Left:** A vertical line above a horizontal line, with "11" written to the left. Below this, the numbers "3 2 1 0" are written vertically, followed by "3 2 1 0" and "1 0 1 2".
- Bottom Right:** A vertical line above a horizontal line, with "11" written to the left. Below this, the numbers "3 2 1 0" are written vertically, followed by "3 2 1 0" and "1 0 1 2".

The work includes several circled numbers (e.g., 1, 2, 3, 4, 5, 6, 7, 8, 9, 10) and arrows indicating the flow of the calculation. The numbers are written in a cursive, handwritten style.

$$u = (1, 5), \quad v = (3, -4)$$



$$\begin{vmatrix} 1 & 3 \\ 5 & -4 \end{vmatrix} = -4 - 15 = \underline{-19}$$

$$P = |-19| = \underline{\underline{19}}$$

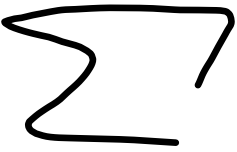
$$\begin{vmatrix} 3 & 5 & 1 \\ 2 & 0 & 1 \\ 1 & 4 & 1 \end{vmatrix} = 5 \cdot 1 \cdot (-1) + 2 \cdot 4 \cdot 1 - 4 \cdot 1 \cdot 3 - 2 \cdot 5 \cdot 1$$

$$= -5 + 8 - 12 - 10 =$$

$$= -27 + 8 = -19$$

$$V = |-19| = \underline{\underline{19}}$$

$$\begin{array}{r}
 x + z = 1 \quad | \quad 1 \quad 1 \quad | \quad -8 \\
 3x - 5z = 4 \quad | \quad 3 \quad -5 \quad | \quad -8 \\
 \\
 | \quad 1 \quad 1 \quad | \quad 1 \quad 3 \quad | \quad 1 \\
 | \quad 4 \quad -5 \quad | \quad 11 \quad -8 \quad | \quad 1 \\
 \\
 x = \frac{1}{8} \quad | \quad z = \frac{1}{8}
 \end{array}$$


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