Homogenous system of equations (Matrix inversion):

- Let $A = \begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$ $X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$ and $B = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$

  Thus, we have, in matrix form $AX = B$

  where A is a square matrix.

Consider system of equations

$$a_1x + b_1y + c_1z = 0$$

$$a_2x + b_2y + c_2z = 0$$

$$a_3x + b_3y + c_3z = 0$$

- If $|A| \neq 0$, then system has trivial solution $(x, y, z) = (0, 0, 0)$

  $A^{-1}AX = A^{-1} \cdot 0 \Rightarrow X = 0$

- If $|A| = 0$, then system has non–trivial (infinite) solution.

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