- Solve homogeneous equation $A\vec{x} = \vec{0}$ to find the intersections of the rows. If they intersect in more than the trivial solution, then we can express the linear space using the free variables:
  - Gaussian
  - set any free variables (variables without pivots) as parameters
  - use the rows to solve for any variables with pivots in terms of the parameters
  - write out the solutions in vector form
  - factor out the free variables to see the solutions as the span of one or more vectors

- Solve homogeneous equation $A\vec{x} = \vec{0}$ to find the intersections of the rows. If they intersect in more than the trivial solution, then we can express the linear space using the free variables:
    - Gaussian
    - set any free variables (variables without pivots) as parameters
    - use the rows to solve for any variables with pivots in terms of the parameters
    - write out the solutions in vector form
    - factor out the free variables to see the solutions as the span of one or more vectors
- For $A\vec{x} = \vec{b}$, where $\vec{b} \neq 0$, if it is consistent with infinite solutions, then we can express solutions as $\vec{x_h} + \vec{x_p}$.

  For example: $t\vec{v_1} + \vec{v_2} = t \begin{bmatrix} v_{11} \\ v_{12} \\ \vdots \end{bmatrix} + \begin{bmatrix} v_{21} \\ v_{22} \\ \vdots \end{bmatrix}$

- Solve homogeneous equation $A\vec{x} = \vec{0}$ to find the intersections of the rows. If they intersect in more than the trivial solution, then we can express the linear space using the free variables:
  - Gaussian
  - set any free variables (variables without pivots) as parameters
  - use the rows to solve for any variables with pivots in terms of the parameters
  - write out the solutions in vector form
  - factor out the free variables to see the solutions as the span of one or more vectors
- For $A\vec{x} = \vec{b}$, where $\vec{b} \neq 0$, if it is consistent with infinite solutions, then we can express solutions as $\vec{x_h} + \vec{x_p}$.

  For example: $t\vec{v}_1 + \vec{v}_2 = t \begin{bmatrix} v_{11} \\ v_{12} \\ \vdots \end{bmatrix} + \begin{bmatrix} v_{21} \\ v_{22} \\ \vdots \end{bmatrix}$
- The number of free variables determines the geometry: 1 line, 2 plane, 3 volume, $n-1$ hyperplane...