

1. Which of the following statements about are true about the nullspace (or null space) and column space of $M = \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$.

Note that M is row equivalent to $M = \begin{bmatrix} 1 & 4 \\ 0 & -3 \\ 0 & 0 \end{bmatrix}$ and when M is augmented with a generic vector and reduced to Gaussian, the last row becomes $[0 \ 0 \ b_1 - 2b_2 + b_3]$

- a) The column space is the plane $b_1 - 2b_2 + b_3 = 0$ in \mathbb{R}^3
- b) The column space is the plane $s \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} + t \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$ in \mathbb{R}^3
- c) The nullspace is the zero vector in \mathbb{R}^2
- d) more than one of the above, but not all of them
- e) all of a), b), and c)

2. If a matrix is not square, then the column space is a subspace of

- a) \mathbb{R} number of rows
- b) \mathbb{R} number of columns
- c) further work must be done to tell

[HTML] The convex basis of the left **null space** of the stoichiometric matrix leads to the definition of metabolically meaningful pools

I Famili, [BO Palsson](#) - Biophysical journal, 2003 - Elsevier

... between the reaction rate vectors, v , and time derivative of metabolite concentrations, dx/dt or x' . Each two subspaces in the domain (ie, the **null space** and row space) and codomain (ie, the left **null space** and **column space**) form orthogonal pairs with one another ...

☆ ⓘ Cited by 103 Related articles All 15 versions

Closed-loop subspace identification using the parity space

[J Wang](#), [S J Qin](#) - Automatica, 2006 - Elsevier

... It is shown that the **column space** of the observability matrix extracted from SOPIM is equivalent to that from SIMPCA-Wc ... (9), we have $(1) \lim_{N \rightarrow \infty} \frac{1}{N} (\Gamma f \perp) T [I - H f] Z f Z p T = 0$. Therefore, $(\Gamma f \perp) T [I - H f]$ is in the left **null space** of $\lim_{N \rightarrow \infty} (1/N) Z f Z p T$. If we ...

☆ ⓘ Cited by 92 Related articles All 6 versions

Production frontiers with cross-sectional and time-series variation in efficiency levels

[C Cornwell](#), P Schmidt, [RC Sickles](#) - Journal of econometrics, 1990 - Elsevier

... Let $PL = Q(Q'Q)^{-1}Q'$ be the projection onto the **column space** of Q and $ML = I - Pp$ be the projection onto the **null space** of Q . We derive three different estimators for (2.3), each of which is a straight-forward extension of an established procedure for the standard panel data ...

☆ ⓘ Cited by 1352 Related articles All 13 versions ⓘ

Degrees of freedom of the MIMO Y channel: Signal space alignment for network coding

[N Lee](#), JB Lim, [J Chun](#) - IEEE Transactions on Information ..., 2010 - ieeexplore.ieee.org

... designed to lie in the **null space** of channel matrix, ie ... Since all users have antennas and the relay equips antennas, there exists a d -dimensional intersection subspace constituted by the **column space** of channel matrices for each user pair. Let denote the ...

☆ ⓘ Cited by 216 Related articles All 5 versions

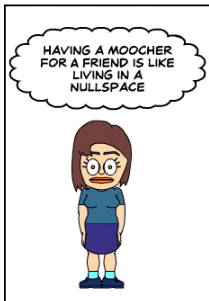
Google Search for null space and column space



3. The definition of a basis is a linearly independent spanning set for V . Which of the following also describes a basis?

- a) A basis is a minimal spanning set for V
- b) A basis is a largest possible set of linearly independent vectors in V
- c) An efficient way (linearly independent) to represent a space (span) linearly
- d) all of the above
- e) two of the above

LIVING IN A NULLSPACE



BY NULL

