Department of Mathematical and Computational Sciences, NITK, Surathkal
Linear Algebra and Matrices (MA 204)
https://sam.nitk.ac.in/sites/default/MA204-ps-4.pdf

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Problem Sheet 4

1. Which of the following subsets of $\mathbb{R}^3$ are actually subspaces?
   (a) the plane of vectors (b_1, b_2, b_3) with first component $b_1 = 0$.
   (b) the plane of vectors (b_1, b_2, b_3) with $b_1 = 1$.
   (c) the vectors (b_1, b_2, b_3) with $b_2 b_3 = 0$.
   (d) the plane of vectors (b_1, b_2, b_3) that satisfy $b_3 - b_2 + 3b_1 = 0$.
2. What is the dimension of the vector space of 2×2 matrices with entries in complex numbers ($\mathbb{C}$) over the field reals $\mathbb{R}$? Write down its basis?
3. Define what is meant by a set of vectors being linearly independent.
4. What are the dimensions of the four fundamental subspaces, if A is 6×3 with rank 2?
5. Find all solutions of $Ax = \begin{pmatrix} 0 \\ 2 \end{pmatrix}$. Express your solution in the form $x = x_{\texttt{particular}} + c_1 x_1 + c_2 x_2$, where x_1, x_2 are special solutions.
6. The augmented matrix $[N \ c]$ is row reduced to $[I \ d]$. What is the relation between N, c and d ?