

Example of Verifying a Subspace By Linear Combos

Ex: $V = \mathbb{R}^{3 \times 3}$, S is the subset of all upper triangular matrices.

$$\underbrace{c_1 \begin{bmatrix} A & B & C \\ 0 & D & E \\ 0 & 0 & F \end{bmatrix} + c_2 \begin{bmatrix} a & b & c \\ 0 & d & e \\ 0 & 0 & f \end{bmatrix}}_{\text{linear combo of two generic upper triangular matrices}} = \underbrace{\begin{bmatrix} (c_1A + c_2a) & * & * \\ 0 & * & * \\ 0 & 0 & * \end{bmatrix}}_{\text{once again upper triangular}}$$

where you can work out the values of the other stars. So S is a subspace.