

1. For each of the following statements, write the word “true” or “false.”

(a) The set $S = \{f \in C[-1, 1] \mid f(0) = 1\}$ is a subspace of $C[-1, 1]$.

False. The set S does not contain the zero function.

(b) For any vector $\mathbf{u} \in \mathbb{R}^3$, the set $T = \{B \in M_{33} \mid B\mathbf{u} = \mathbf{0}\}$ is a subspace of M_{33} .

True. If $B, C \in T$, then $(B+C)\mathbf{u} = B\mathbf{u} + C\mathbf{u} = \mathbf{0}$. If $B \in T$ and $\alpha \in \mathbb{R}$, then $(\alpha B)\mathbf{u} = \alpha(B\mathbf{u}) = \mathbf{0}$.

2. Find $NS(A)$, as a subspace of \mathbb{R}^3 .

$$A = \begin{pmatrix} -3 & -1 & -1 \\ 0 & 1 & -2 \\ 9 & 1 & 7 \end{pmatrix}$$

This matrix row reduces to

$$\begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & -2 \\ 0 & 0 & 0 \end{pmatrix},$$

so therefore

$$NS(A) = \{(-z, 2z, z)^T \mid z \in \mathbb{R}\}.$$