
Exercise 1 True or False? If False, you should come up with a counterexample. If True, can you give a proof?

1. If V is a subspace of $\mathbb{R}^n$ and $\mathbf{x} + \mathbf{y}$ is in V , then $\mathbf{x}$ is in V or $\mathbf{y}$ is in V .

Multiple Choice:

- (i) True
- (ii) False

2. If V is a set in $\mathbb{R}^n$ such that $c_1\mathbf{v}_1 + c_2\mathbf{v}_2$ is in V whenever $\mathbf{v}_1$ and $\mathbf{v}_2$ are in V for any scalars c_1, c_2 , then V is a subspace.

Multiple Choice:

- (i) True
- (ii) False

3. Every set of four non-zero vectors in $\mathbb{R}^4$ is a basis.

Multiple Choice:

- (i) True
- (ii) False

4. $\mathbb{R}^3$ has a basis of the form $\{\mathbf{x}, \mathbf{x} + \mathbf{y}, \mathbf{y}\}$.

Multiple Choice:

- (i) True
- (ii) False

Source

[Nicholson] W. Keith Nicholson, *Linear Algebra with Applications*, Lyryx 2021, Open Edition, Exercise 5.1.