
Exercise 1 Are the following vector spaces with the indicated operations?

1. The set V of all polynomials of degree greater than or equal to 3, together with 0; operations of $\mathbb{P}$.

Multiple Choice:

- (i) V is a vector space.
- (ii) V is not a vector space.

2. The set V of all polynomials of degree less than or equal to 3; operations of $\mathbb{P}$.

Multiple Choice:

- (i) V is a vector space.
- (ii) V is not a vector space.

3. The set V of 2×2 matrices with zero determinant; usual matrix operations.

Multiple Choice:

- (i) V is a vector space.
- (ii) V is not a vector space.

4. The set V of all 2×2 matrices whose entries sum to 0; usual matrix operations.

Multiple Choice:

- (i) V is a vector space.
- (ii) V is not a vector space.

Source

[Nicholson] W. Keith Nicholson, *Linear Algebra with Applications*, Lyryx 2021, Open Edition, Exercises 6.1.2.