



2.1.2 The zero vector

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Introduction

- In this topic, we will
 - Define the zero vector
 - Describe the representation
 - Describe its significance





The zero vector

- The n -dimensional vector is a vector with n entries, all of which are zero
- It is represented with a bold “0” with a subscript n :

$$\mathbf{0}_2 = \begin{pmatrix} 0 \\ 0 \end{pmatrix} \quad \mathbf{0}_5 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix} \quad \mathbf{0}_8 = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$





The zero vector

- The zero vector is the same for $\mathbf{R}^n$ and $\mathbf{C}^n$
- We may refer to the zero vector as *the origin*
- If the dimension is obvious or not relevant, we will just use $\mathbf{0}$
- The zero vector will play a similar role to the 0 element in a field with respect to vector addition
- If the zero vector is being handwritten,
it will be a zero with an arrow above it: $\vec{0}_n$ or just $\vec{0}$





Summary

- Following this topic, you now
 - Understand the idea of the zero vector
 - Know how it will be represented; as $\mathbf{0}_n$ or as $\vec{0}_n$
 - Are aware we may leave off the n if the dimension is either obvious or irrelevant





References

- [1] https://en.wikipedia.org/wiki/Zero_element#Additive_identities





Acknowledgments

None so far.





The zero vector



Colophon

These slides were prepared using the Cambria typeface. Mathematical equations use Times New Roman, and source code is presented using Consolas.

The photographs of flowers and a monarch butter appearing on the title slide and accenting the top of each other slide were taken at the Royal Botanical Gardens in October of 2017 by Douglas Wilhelm Harder. Please see

<https://www.rbg.ca/>

for more information.





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