

MATH 253

Today

1. 2.3 Vector Spaces continued (Understand the abstract definition of a vector space and apply it to prove basic properties.)
2. WeBWorK

Where is today's material used?

1. Physics (solutions to Maxwell's equations in free space, quantum mechanics, Fourier series, ...)
2. Math (subspaces appear throughout mathematics)

Warm-up

Is $\{0\}$ a vector space over \mathbb{R} ?

Basic Properties

Theorem 1. *Let V be a vector space over a field F , and let $u, v, w \in V, r \in F$.*

1. *The additive identity 0 is unique.*
2. *If $u + v = u + w$, then $v = w$.*
3. *The additive inverse of any vector is unique.*
4. *$r0 = 0$, where 0 is the zero vector.*
5. *$0u = 0$, where the first 0 is a scalar and the second is a vector*
6. *$-u = (-1)u$.*
7. *$ru = 0$ implies $r = 0$ (scalar) or $u = 0$ (vector)*

Next Time

1. Review