September-19-12
9:32 AM

APUS / Tutorials 4:15–6...

Read Along. Appendix D, sections 1.1–1.2.

Riddle Along. Can you cover a chessboard, with two diagonally-opposite squares removed, with 31 2×1 domino pieces?

31 

$\mathbb{C} = \{(a,b) : a,b \in \mathbb{R}\}$ $\quad 0_{\mathbb{C}} = (0,0)$ $\quad 1_{\mathbb{C}} = (1,0)$ $\quad i = (0,1)$

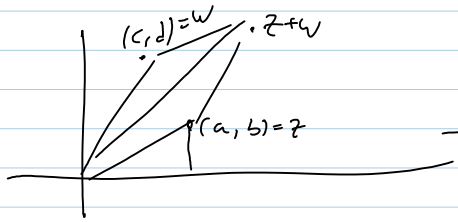
$(a,b)+(c,d) = \ldots$ $\qquad -(a,b) = \ldots$

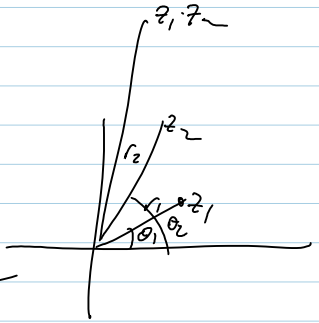
$(a,b)\times(c,d) = \ldots$ $\qquad (a,b)^{-1} = \ldots$

Contains $\mathbb{R}$ as $\{(a,0)\}$, $\quad i^2 = -1$

$a+bi = (a,b)$

Interpretation





Waves, AC, RLC $\qquad V = RI$ $\qquad V = I/C$

Why aren't we also adding $\sqrt{i}$?

Hour 2. V.S. and subspaces as in textbook.

Motivation: Forces can be added and multiplied by scalars.

Def Let F be a field. A V.S. over F is a set V, with a special element $0 \in V$, a binary $+ : V \times V \to V$

and a binary $\cdot : F \times V \to V$, s.t.

done line

VS1. $x+y=y+x$ VS2: Assoc.

VS3. 0 VS4: $-$

VS5: $1 \cdot x = x$ VS6 $a(bx) = (ab)x$

VS7 $a(x+y)$ VS8 $(a+b)x$

Examples: 1. F^n

2. $M_{m \times n}(F)$

3. $\mathcal{F}(S, F)$ S a set

4. Polynomials

5. $\mathbb{C}/\mathbb{R}$ $\mathbb{R}/\mathbb{Q}$ "Galois Theory"

Thm 1. Cancellation law: additive, 2x multiplicative.

2. 0_V is unique

3. negatives are unique.

5. $0 \cdot x = 0$ 6. $a \cdot 0 = 0$

7 $(-a)x = -(ax) = a(-x)$

8. $cv = 0 \Rightarrow c = 0 \vee v = 0$