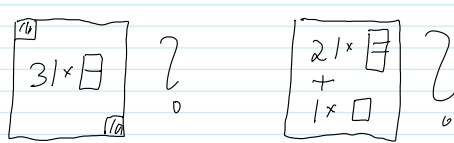


Office Hours. Wed 3-4 this week & next.

HW2 is on web!

Apology.  $(a, b) \neq 0 \Leftrightarrow a \neq 0 \vee b \neq 0 \Leftrightarrow a^2 + b^2 > 0$   
 Sorry!

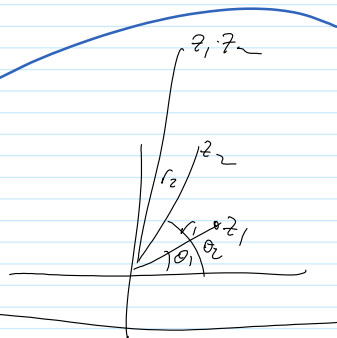
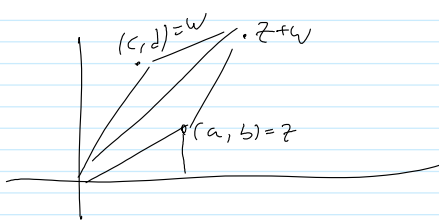
Read Along sections 1.1-1.4 of textbook.

Riddle Along 

Today: Try more on  $\mathbb{C}$ , vector spaces.

Reminder 1.  $(a+bi) + (c+di) = (a+c) + (b+d)i$

2.  $(a+bi)(c+di) = (ac-bd) + (bc+ad)i$



$V = RI$   
 $V = I/C$

Waves, AC, RLC

Why aren't we also adding  $\sqrt{i}$ ? Ans:  $\mathbb{C}$  is "algebraically closed"

vector spaces.

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

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

VS3.  $0$  VS4: -

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

done  
line

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

Examples: 1.  $F^n$

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

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

4. Polynomials

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

Thm 1. Cancellation law: additive,  $2 \times$  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.  $cV = 0 \Rightarrow c = 0 \vee V = 0$