

#ret

1 | Square roots of i

20math530retSquareRootsi.pdf Didn't figure it out. How did I get $a = \pm \frac{\sqrt{2}i}{2}$??

2 | Cross product

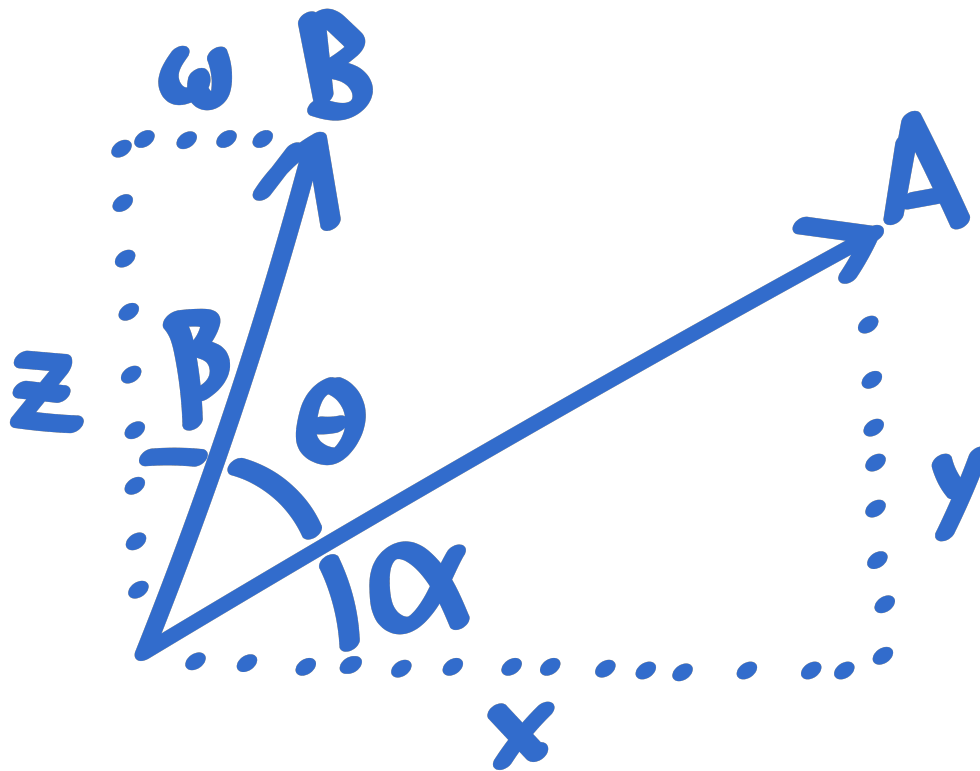
Find the cross product of $\begin{pmatrix} 1 \\ 3 \\ 0 \end{pmatrix} \times \begin{pmatrix} 2 \\ 2 \\ -1 \end{pmatrix}$

\[\]

3 | Read Chapter 1.B

3.1 | Vector Space Addition/scalarmult

- Every pair of elements in V can be added together to form another element in V (closed)
- **A scalar is anything in F , which means it might be complex!** ### Vector space definition
- commutativity(!): $u + v = v + u, \forall u, v \in V$
- associativity: $(u + v) + w = u + (v + w)$ and $(ab)v = a(bv), \forall u, v, w \in V, \forall a, b \in F$
- additive identity: $\exists 0 \in V \mid v + 0 = v, \forall v \in V$
- Additive inverse
- Multiplicative identity (denoted 1)
- distributive property (both front and back) A vector space depends on F so V is a **vector space over F** ### Vector spaces with other sets? F^S
- F^S is the set of functions from S to F
 - meaning that it's all functions whose domains are subsets of S and ranges are subsets of F ?
- addition $f, g \in F^S, x \in F : (f + g)(x) = f(x) + g(x)$
- multiplication: $\lambda \in F$ and $f \in F^S : \lambda f \in F^S = (\lambda f)(x) = \lambda f(x)$
- functions can be elements in fields or something?
- lists are just functions on a set of numbers..?
- subtraction (additive inverses and identity are unique)
- **When you see xy , one of them has to be a vector because there is no scalar scalar multiplication defined** ## Show that $a \bullet b = |a||b|\cos\theta$ Suppose $a = \begin{bmatrix} x \\ y \end{bmatrix}$ and $b = \begin{bmatrix} w \\ z \end{bmatrix}$. We have $a \bullet b = a^T \cdot b = \begin{bmatrix} x & y \end{bmatrix} \begin{bmatrix} w \\ z \end{bmatrix} = xw + yz$. We need an expression for θ :



As seen in the diagram, $\theta = \frac{\pi}{2} - \alpha - \beta$. Finally: \[\]

4 | Epilogue

That was two hours... I'll save the proving integers mod 3 are a field for later. #todo-exr0n
