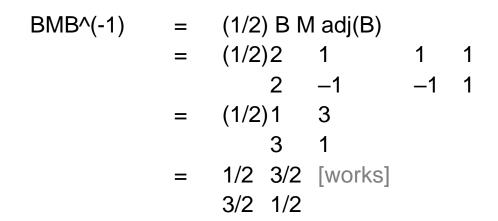
$$v1 = 1$$
 to 2 $v2 = -1$ to 1
1 2 1 -1

matrix of T wrt std basis (e1, e2) of F^2?

1) matrix wrt (v1, v2):
$$M = 2$$
 0 0 -1

2)
$$v1 = e1 + e2$$
 $B = 1 -1$ $v2 = -e1 + e2$ 1 1

3)
$$det(B) = 2$$
 $[B^{(-1)} = 1/2 \ 1/2]$ $adj(B) = 1 \ 1 \ -1/2 \ 1/2]$



Df given a linear op T : V to V a subspace W sub V is T-stable iff w in W implies Tw in W

matrix wrt (v1, v2) easier to understand

for any linear op T : V to V,
{0} and V are are [trivially] T-stable

Ex suppose that wrt some basis, T: F^3 to F^3 has the matrix

* * 0

* * 0

0 0 *

nontrivial T-stable subspaces? $\{(x, y, 0) \mid x, y\}$ $\{(0, 0, z) \mid z\}$

when a matrix for T has nontrivial <u>diagonal blocks</u>, the blocks indicate nontrivial T-stable subspaces [why care?] when V = sum_i W_i for T-stable W_i, studying T reduces to studying T|_{W_i} for all i

best situation: each W_i is a line

[what means?]

in this case: there is a basis (w_i)_i s.t.

 $W_i = Fw_i$

Tw_i = a_iw_i for some i

matrix of T wrt w_i is diagonal

<u>Df</u> for any linear op T : V to V

an <u>eigenline</u> of T is a T-stable line [dim-1 sub.] an <u>eigenvector</u> of T is v in V s.t. Fv is an eigenline (which forces v ≠ **0**) if Tv = λv, then we call λ the eigenvalue of the line

<u>Ex</u>	T : F^2 to F^2 1/2 3/2 3/2 1/2	given by the matrix wrt the std basis	λx λy	=	0	0	x y	=	О У
{(x is an eigenline with eigenvalue 2 x)}			_	[take $\lambda = 0$:] Fe1 is an eigenline with eigenvalue 0 [take $\lambda \neq 0$:] Fe2 is an eigenline with eigenvalue 1					
{(x is a -x)}	ın eigenline with eig	genvalue –1	<u>Ex</u>		N: 0 1	F^2 to F^ 0 0	-2	•	en by the matrix the std basis
Ex	P : F^2 to F^2	given by the matrix	λx	=	0	0	X	=	0
	0 0 0 1	wrt the std basis	λy		1	0	У		X
[does P have any eigenvectors?]			[regardless of λ :] $x = 0$ Fe2 is the only eigenline with eigenvalue 0 [same regardless of whether $F = R$ or $F = C$]						

<u>Ex</u>	H: R^2 to R^2 1 –1 1 1	given by the matrix wrt the std basis	compare to H': C^2 to C^2 given by 1 -1 1 1
λx =	1 –1 x	= x - y	claim: 1 + i and 1 – i are eigenvalues
λy	1 1 y	x + y	
messy to	solve		(1 + i)x = x - y imply $ix = -y$ and $iy = x$
-			(1+i)y = x + y
notice:	$(1/\sqrt{2}) H = 1/\sqrt{2}$	/√2 –1/√2	
	1,	/√2 1/√2	so {(x is an eigenline with eigenvalue 1 + i
	= C0	os($\pi/4$) –sin($\pi/4$)	ix)}
		$in(\pi/4)$ $cos(\pi/4)$	/ ,
			similarly
so H is the composition of: rotate by $\pi/4$			$\{(x \mid s \mid an \mid eigenline \mid with \mid eigenvalue \mid 1 - i \mid eigenvalue $
		scale by √2	-ix)}
no H-stah	ble lines through	•	" ' ')
110 11 Star			

Rem	C^2 is iso to	the comp	lex'n of R^2	Summary			
	(R^2)_C =	H_C to	(R^2)_C		stable under T : V to V study T in terms of smaller op's T _W		
	C^2	to H'	C^2	nicer when nicest when	W is a line V is a sum of eigenlines		
<u>Moral</u>	choice of R	vs C affec	ts eigenstuff	over R over C	T may have no eigenlines T will have some eigenline [later], but V need not be sum(eigenlines)		
			has no eigenvals, have eigenvals				
	[later: we wi	ll show it h	nas at least onel	Q for next time			
	[later: we will show it has at least one]			let D : F[x] to F[x] be D(p) = dp/dx what are the D-stable linear subspaces?			