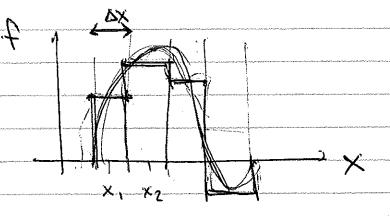
LECTURE 3

28 857

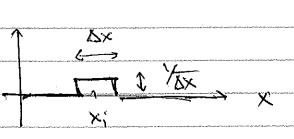
LAST TIME: "DISCRETIZED FUNCTION" AS A ORUTCH TO UNDERSTAND PUNCTION SPACE AS VECTOR SPACE.



BASIS VECTORS: CORRECTION from LIST TIME

 $|e'\rangle = \sqrt[3]{2} \times \left[\left(x_1 - \frac{x_1}{2}\right), \left(x_1 + \frac{x_2}{2}\right)\right]$

6:60



WHY? A GOOD PASISED IS ORTHONORMAN

product.

ON OUR FAVORITE PUNCTION SPACE (HUBBET SPACE) WE HAVE THE POLISHING INNER PRODUCT < (1x) 8 (1x) 7 = (2) (12) (12) (12) (12) (12) (e; lei) =0 because 17 × 1 = 0 " has no support" $\langle e | \langle e \rangle \rangle = \langle e \rangle \langle b \rangle \langle b \rangle \langle b \rangle \langle b \rangle = \langle b \rangle \langle b$ on: (e:lei) = ox Si -> S(xi-xi) + Si SO I UBO LAST TIME, THIS IS A WELFO BAJIS ? IS PART OF THE WEIRDNESS SOUNTS OF OO-DIM VECTOR SPACES! IN PART THIS IS BECAUSE & PUNCTUONS ARE NOT REAL DUNCTIONS AND AROU'T PART OF OUR PUNCTION SPACE. WE THE TO USE THEM AS BASIS YESTERS, THE COST is warp believed une (eile)

	Mb 1 DON'T THINK YOU CAN FIX THIS
	eg. IF YOU USED
	IED = III
	then (eilej) = = Eily)es(xio) dx = # Sij v
	BUT THEN: EI(x) is NOT NORMANZED TO INTEGRATE TO 1 TO DESM'T become S- An
	> = \$ = f(xi) Dx ei> weird
	C;
	WHAT'S REALLY HAPPENING is
	WHEN $x_i = x_i$ (NTERPRET AS DISTRIBUTION.
##RQDA:gg#AAAMAQueth.nb	Service of the servic

anywhy: ALL THAT IS TO SHOW THAT SOMETIMES OUR INTURCON BREAK'S DOWN.

top whom GoING FROM FINTE-> 00 BOF.

AS PHYSICISTS: PUSH ON ANYWAY!

(UMESS IT BREMICS WHERE)

BY INFORMATION 1055 PROBLEM

SO' DIFFERENTAL SPERATORS ARE SIMPLY MATRICES IN THIS PACE

Appropriate Contract of the Co	WHAT AROUT SECOND DERWATULES?
President of the second	
Contraction and the second second second	$\frac{1}{4} \left(\frac{1}{2} \frac{1}{(x_i)^2} \frac{1}{(x_i)^2} \frac{1}{(x_i)^2} \right) = \left(\frac{1}{2} \frac{1}{(x_i)^2} \frac{1}{(x$
-	\$ i+1 \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
A PROPERTY OF THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAMED IN COLUMN TWO	
- Consideration and the Company of the Constitution of the Constit	Q: HAS AMONE USED 3 PO O DIFF EQ? (d'2)/dx2
Complete Commence and Complete Commence	BSERVE: as you expect intuitively from taylor expansion,
CHARLES OF THE PARTY OF THE PAR	The state of the s
	HIGHER PROBR DERIVATIVES
- Company of the contract of t	ARE INCREASINGLY NONLOCAL, PROBE SPACETIME (SPACETAME)
Andread State of the State of t	POINTS THAT ARE FAR APART
Sindan Newscare, and complete the commence of	
CHROSER CONTRACTOR OF THE PROPERTY OF THE PROP	You also probably have a good sense now that Physics is Local.
-	now triat pring sics is Local
A A SA	9 80 IT IS DESCRIBED BY LOW ORDERS OF
Accessor to the second second	DERLYATIVES. R
	NEED SOME DEAV. BK
Nessentante de la constante de	WE'RE DESCRIBING DYNAMICS
Consessant annual Spirit and annual	(how things change in thre)

80		SOMETH NG	
	0 /	<u> </u>	

 $f(x_i) = \dots$

typically up to 2000 order.
WHY SECOND ORDER I NOT THEO? FOURTH?

> DIMENSIONAL ANAMUSS.

4 HAS DIMENSIONS

ACTION DOES TOO (not in notural units)
in not units e 2 i cuess

S= Jde L = Jdux 2 prm prm prm

IF YOU WANT A TERM IN I WITH MORE
DERWIFTLIVES, YOU PICK UP STHER DIMENSIONPUL PARAMETERS TO COMPENSATE.

(>) TUPITHIN GET K/ SUPPRESSION.

AIF> = 19> => Jdy A(x,y) fly) = g(x)
C
= Ais f: = gi
PINOTO SOME ENOTORS - NOT
WHAT DOES THIS ONEAN
Green's functions: F=(A-1)g
UNEAR DIFF. OPERATORS
A(xy) is written to cook monument.
WE CAN ALSO WRITTE IT IN AN "EXPANSION
IN LOCALITY" ie AS A DIFFURENTUM OPERATION
A=ZanCx)(Jx)
A = Zan(x)(dx)" DIFFERENCIAL SPECIALOR
work punction
4 REWARK: SEE SG 832 FOR NORMAL FORM
L3 GIVES SCHEDDINGER-TUPE EQ,
in physics, appenly astx) dx + a, (x) dx + a, (x) f
DEF: P= h(x) f(p) - TELED
(azh)f" + (a, h+2azh)f' + (ash+q, V
SET =0; N = exp[-2] × (2/4) dx
ther a get to of four
(b, (x)(2)2+b, (x)] + = = sews of.
(-2 - WX)

USEPULTO DEF A GENERALIZED LINNER PRODUCT:
$\langle f(g)_{w} = \int_{0}^{\infty} M(x) f^{*}(x) g(x) dx$
PUNCTIONS OBJUNG WEIGHT FUNCTIONS BOUNDARY CONDITIONS BY MELPIC COMES IN TE
85 HAVING A WEIGHT HERE IS ACTUALLY RATHER NATURAL.
eg also in curved space witter 24x -> NIg1 24x
THEN WE ARO WANT SENSE OF HERMITICITY
<pre><pre><pre><pre><pre><pre><pre><pre></pre></pre></pre></pre></pre></pre></pre></pre>
UN-DIFF. OPERATION
wont: Jo w(x) f+(x) (\(\frac{2}{2}\) anco(\(\frac{2}{2}\)) g(x) dx
St EXPL SUMS DAME.
HOW TO DO IT? INTEGRATION BY PARTS.

USEPUL EXAMPLE: 10 MOMENTUM				
	(flg) w=1 -) fx(x) g(x) dx var L2 norm			
	WARDINGTIONS IN OM (& functions)			
\$(ta)=	Savare increments -> (Be) @ as			
P'g + fg'				
	(f/Pg) = (f*(v) (-1 dx) g(v) dx			
group transients y terre autoritement à autorité à dui basse production de la conference difference de l'action				
در د	(C)) (dx f*(4)) g(x) dx -i) dx (P*g) dx			
	= (=idx f(x)) g(x) dx restar DEON.			
	+ 1 d/1 2 dx = 1/2 Q			
والمنافضة والمسترون	= (41/2) + 1 = 3 m			
"The destroyer was the distance of the distance of the constraint	DI=D = Q = 0 as long as			
	STECF ADSOINT > Pac			
	(HERMICIAN)			
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	DEFINITION OF MEDINITION BAND-			
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s or Province with the Mark Advance of the Mar	-> Regenvalues, sounds Erbenfun.			

STURM-LIOUVILLE PROBUSMS.
IT IS CHAMON IN PHYSICS TO HAVE
PUNCTOPINS (like HAMUTODIANS) of THE
FORM:
('sc 1.17%)
S[f]= 1x, (2p(x)(p(x))2+2g(x)p(x)2) dx
f(x) = 0 @ x, x =
from hormous of 1x to dx = 1
IN STORE ? GLOBARI & 1.5 THIS IS THEATED AS
is larrance muzuriter problem.
10 w 1070
10 WE TO WRITE AS 8(F) = Sn2F(x) O F(x) dx
BECKUSE THEN SOM B
Of(x) =0.
PROPRIEM B & PCD (& F(w)) (& F(w))
1121 BY PARTS.
三一言印的盖印的是印的
END UP WI [-[P(x) f'(x)]' + 9f =0

Strom-Louville proposer about.

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	REDUCE TO BEVEM - CLOWINE PORM					
59. P.	$A = a_n(\frac{d}{dx})^2 + a_n \frac{d}{dx} + a_0$ $T = T = \text{functions of } x$					
and the second of the second o	T I functions of x					
CHOM OF	-> SUPPOSE 0270 over DOMAIN 1 CLI EUR					
SINCULAR						
althu antha a sall th u thu tha a Fina a sall file harries had the desiral and althum tha a thin a sall and the sall and	$DGF.$ $W = \frac{1}{a_2(x)} \int_{x_1}^{x_1} \frac{Ba_1(y)}{a_2(y)} dy$ we rest?					
	positive on (xn x 2)					
	Af = w(wazy')' + 024					
	- [w/o w/ + woto] , wo-all 1					
	w [w'azy' + wazy' + wazy"]					
	wa, - 92'wg'					
	MON Check: (GIVD) = (YELD)					
	(+1+9) = dx w \((waz g')' ft + 9 = ft g					
- (Waz F") g + a6 F" g]						
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	- Jak (waz go fr) + waz gift / DIMCHER or					
	= \$ [Wazg'f+-Wazgfxi]x					
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	· ~ 1(V					

EIGENVALUE PROPLEM B

 $AA = \lambda A$

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[wazf')' + wasf = 2wt

the following mint:

IF YOU SEED AN EXCENUM EQ.

WI WEIGHT ON RHS ! SUSPECT

IT IS SELF- APPOINT WPST W.

R eigenvals appelled Eigent -

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			The manufacture of the post of the state of the post of the state of t
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A NONUNEAR contains powers of f(x) or [(\string) f(x)] (P) DIFF to connot be written as A.f what to do is you're baced w/a montinear DIFF GQ? GO HOME & RECONSIDER YOUR UPO CHOICES some other = 8(x) HOMOGENEOUS IN MOMPREMISEN S green's functions just salve it

PITEL TOBETHELL SOUTHON