Welcome to Math21b Linear Algebra and Differential equations

Fall 2003
Oliver Knill
Organisation
Our coordinates:

Oliver Knill
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Izzett Coskun
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About myself:

I grew up in Switzerland.
Here are some pictures....
Back to business:

You find most of the course information online at

http://www.courses.fas.harvard.edu/~math21b

The handout is a snapshot of the syllabus
Exam Dates:

1 Midterm: Wed, Oct 22, 7:30
2 Midterm: Wed: Nov 19, 7:30
Final Exam: To be scheduled by registrar.
Grading Scheme:

20% M1  First midterm
20% M2  Second midterm
20% HW  Homework
40% Final
Working on problems is extremely important. Therefore:
Tough Homework Policy

No Homework
EXTENSIONS
But:

We delete the 2 lowest HW scores and solutions will be posted early!
Textbook

Otto Bretscher,
Linear Algebra with Applications
Second Edition
Available in Coop
Covered Topics

Chapters covered in this course, (see syllabus, for more details)
Covered Topics 1

1: Linear Equations
2: Linear Transformations
3: Linear Subspaces
4: Dimension
5: Orthogonality
6: Determinants
7: Eigensystems
Covered Topics II

8: Diagonalisation
9: Stability
10: Differential equations
11: Function Spaces
12: Fourier Theory
13: PDE’s
Where is linear algebra used?
For example: covariance matrix, data fitting,
Computer graphics

Linear transformations
Mechanics/Stability
Chemistry
Codes
Number theory
Quantum Mechanics
Partial Differential equations
Error Correction
Understanding Higher dimensions
Dynamical systems
2D/3D graphics
Computergames
A Hatsumon

(Japanese for “asking a question”,

In education used as “hook questions”)

Will Hunting’s problem:

Given the graph

Find:
1) the adjacency matrix $A$
2) the matrix giving the number of 3 step walks
3) the generating function for walks from point $i \to j$
4) the generating function for walks from points $i \to j$
Will Hunting’s problem
Will Hunting’s problem

\[ L = \begin{bmatrix}
0 & 1 & 0 & 1 \\
1 & 0 & 2 & 1 \\
0 & 2 & 0 & 0 \\
1 & 1 & 0 & 0 \\
\end{bmatrix} \]
Sectioning I
Sectioning 2

Please enter the first 8 digits of your Harvard ID number in the form 12345678:

Ready

ssh1: 3DES 24, 1 24 Rows, 80 Cols VT100 NUM

To release cursor, press Ctrl-Alt.
Welcome to the Math Department Sectioning Program. Please confirm that the following information is correct:

- Last name: Knill
- Given name: Oliver
- Email address: knill@math.harvard.edu
- Gender: Male
- Year: Other
- Concentration: Undeclared
- House: None

Is the above information correct? [Y/N]
Sectioning 5

Math Department Sectioning Program

Please select your section choices in order of preference. Type D when done.

0: MWF 9-10  Physics (w/suff enrollment) [1 section]
1: MWF 10-11  (w/suff enrollment) [1 section]
2: MWF 10-11  BioChem (w/suff enrollment) [1 section]
3: MWF 11-12  [1 section]
4: TTh 10-11:  [1 section]
5: TTh 11:30-  [1 section]
Tonight at 7 PM, Room 507

Preview/Review

Tips how to succeed in this course
Review and discussion of some topics relevant for this course.