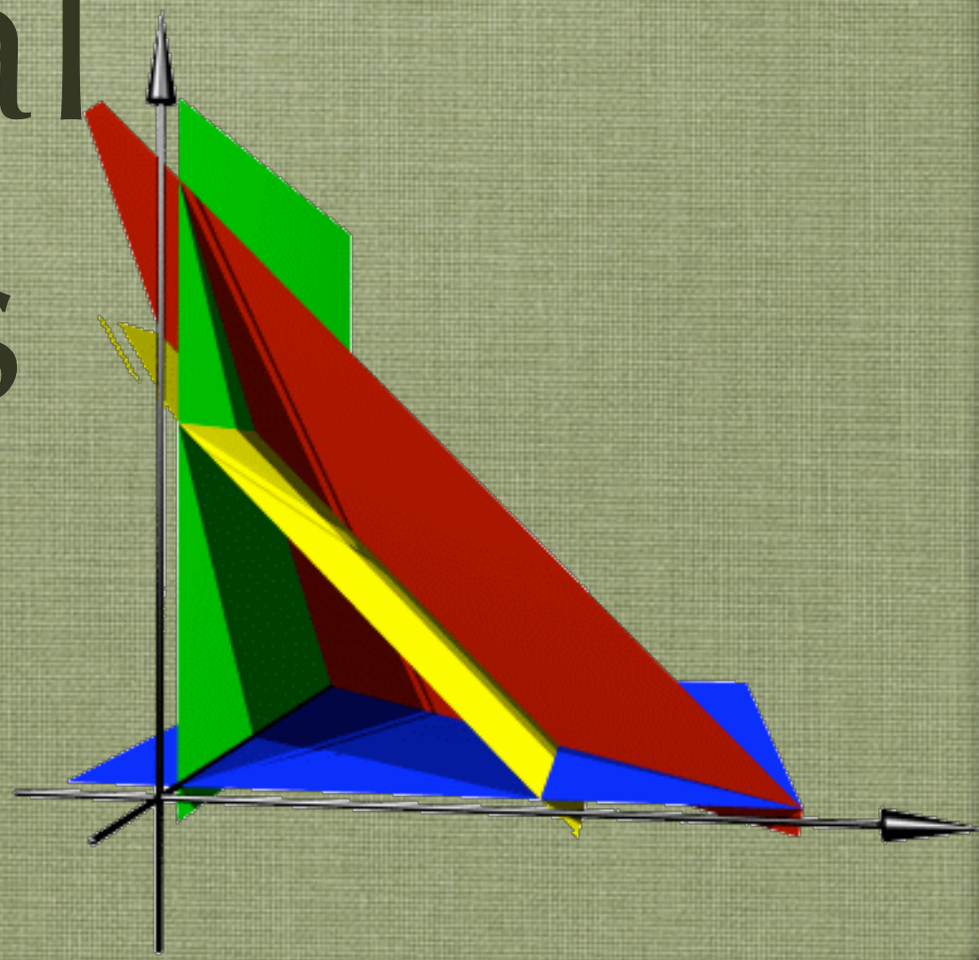
Welcome to Math21b Linear Algebra and Differential equations

Fall 2003

Oliver Knill



Organisation

Our coordinates:

Oliver Knill
Sci Center 434
knill@math.harvard.edu

Izzett Coskun
Sci Center 333b
coskun@math.harvard.edu

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

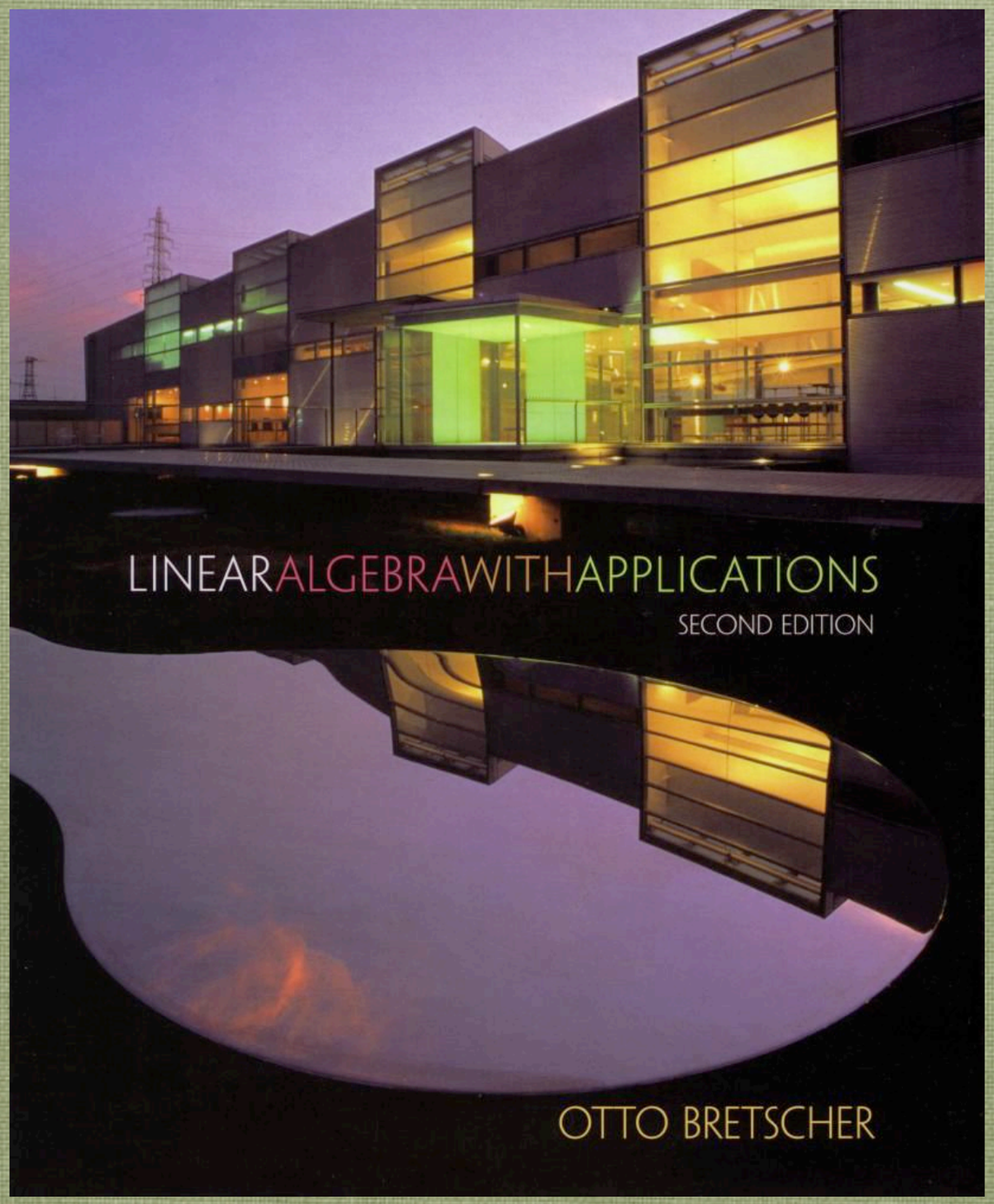
NO HOMEWORK

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 I

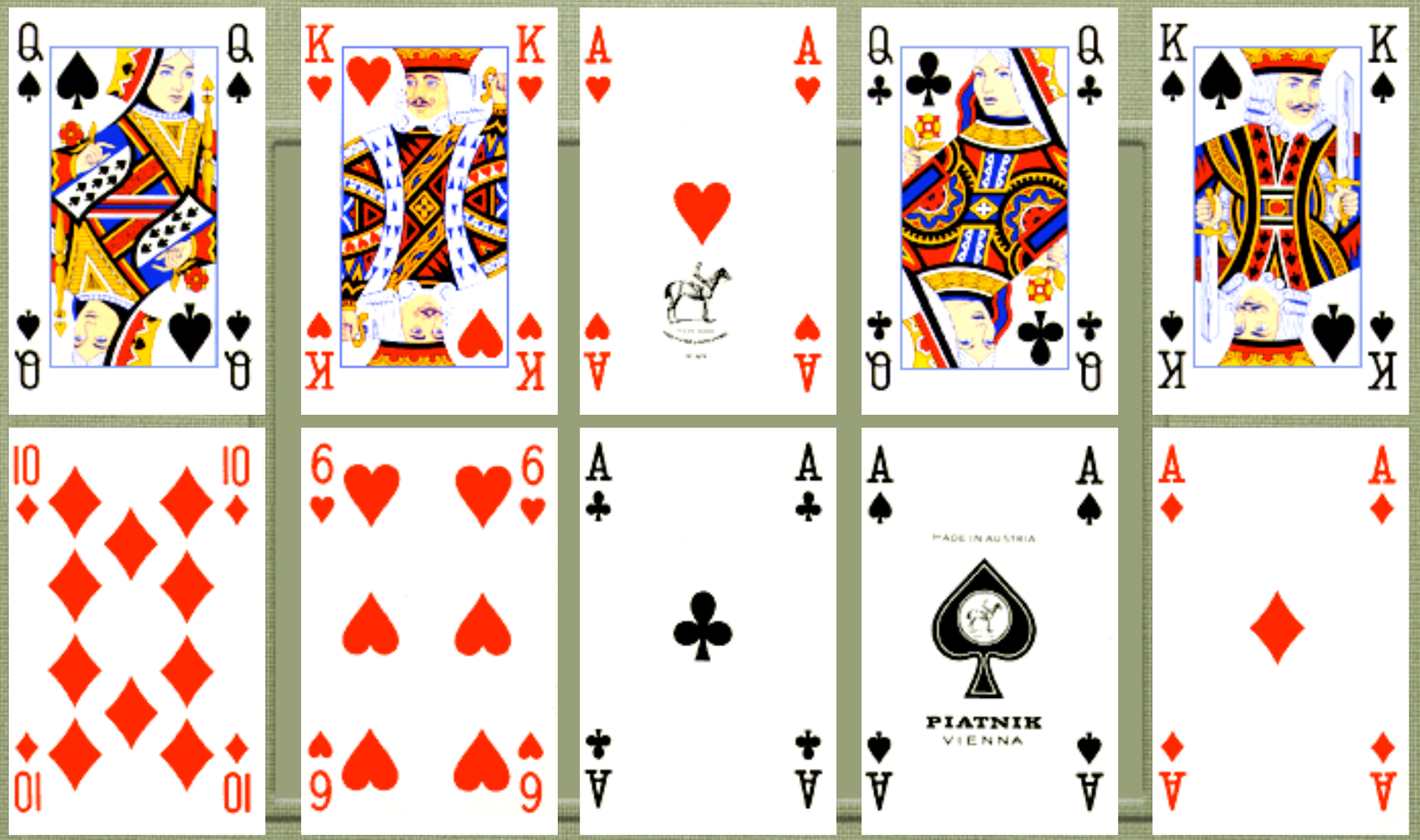
1: Linear Equations
2: Linear Transformations
3: Linear Subspaces
4: Dimension
5: Orthogonality
6: Determinants
7: Eigensystems

Covered Topics II

8: Diagonalisation
9: Stability
10: Differential equations
11: Function Spaces
12: Fourier Theory
13: PDE's

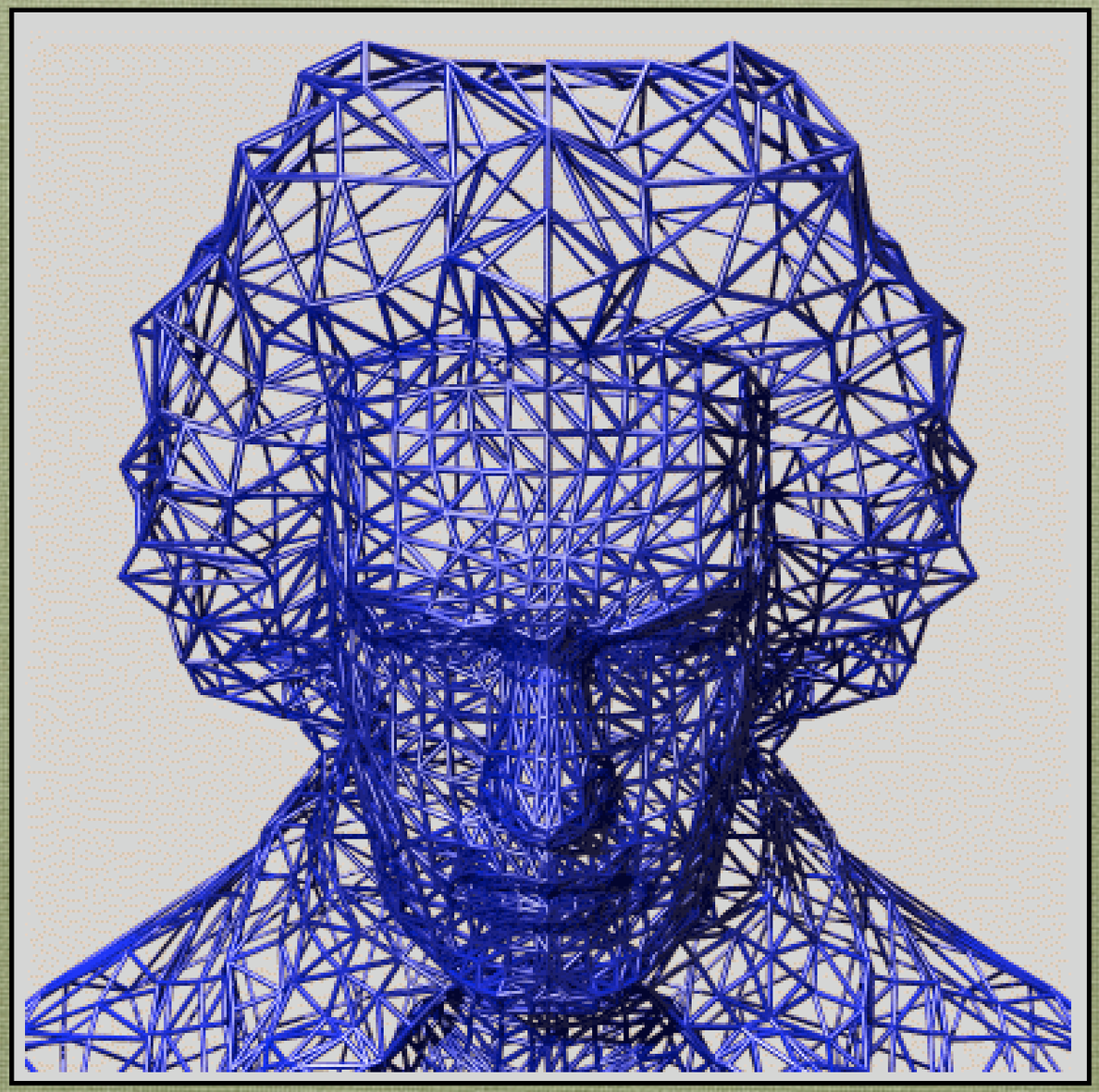
Where is linear algebra used?

Statistics



For example:covariance matrix, data fitting,

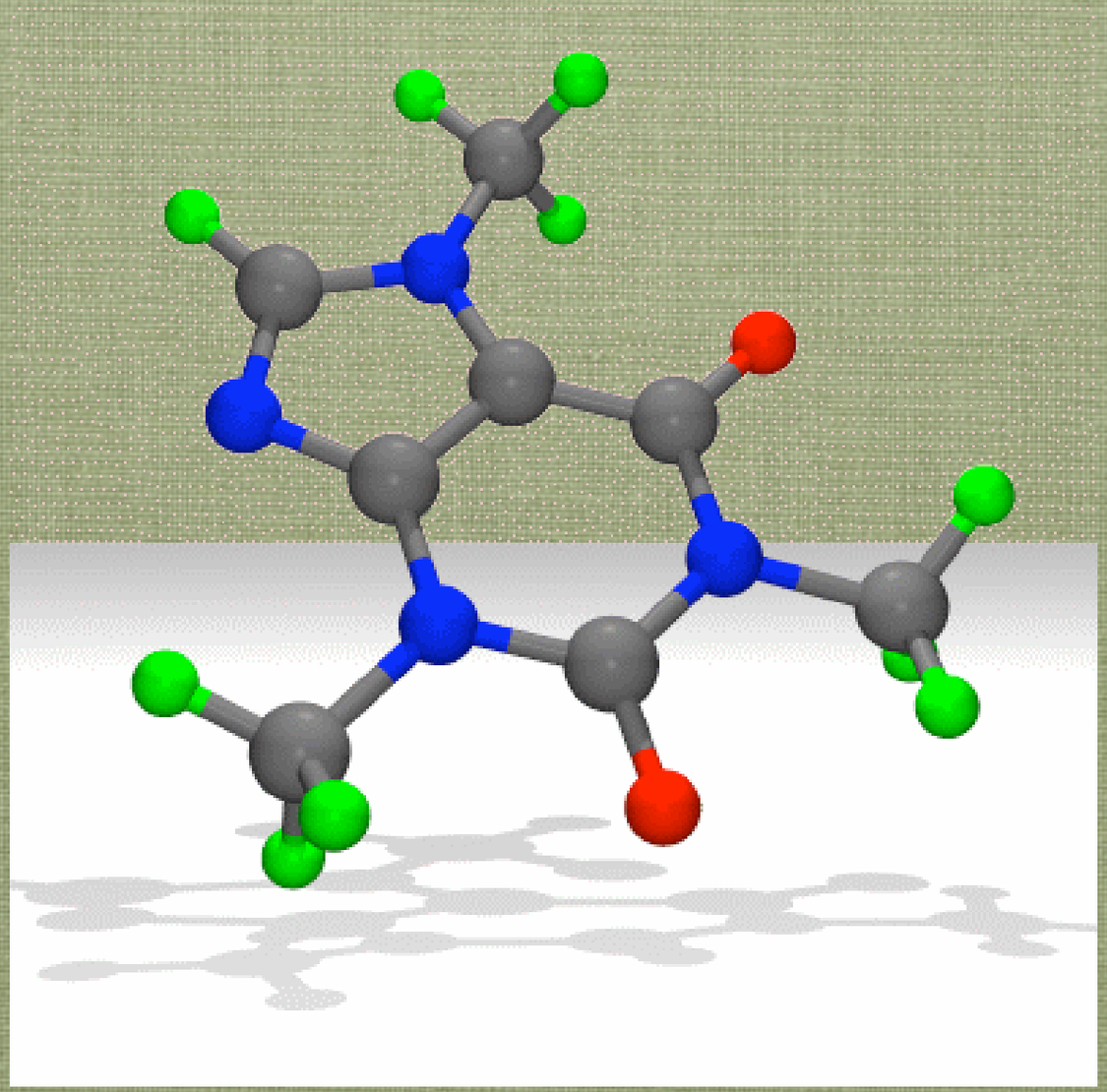
Computergraphics



Linear transformations

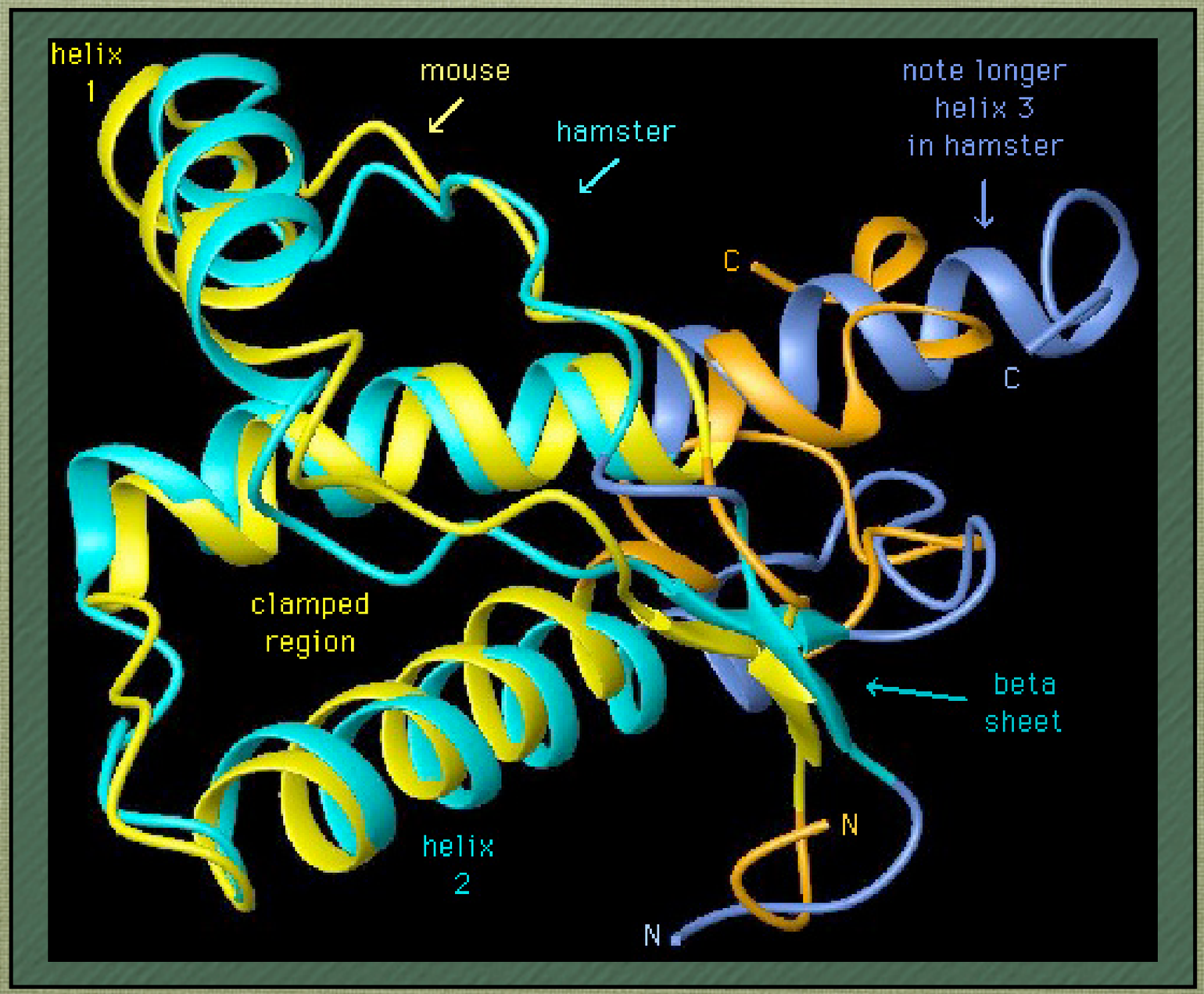
Mechanics/Stability

Chemistry

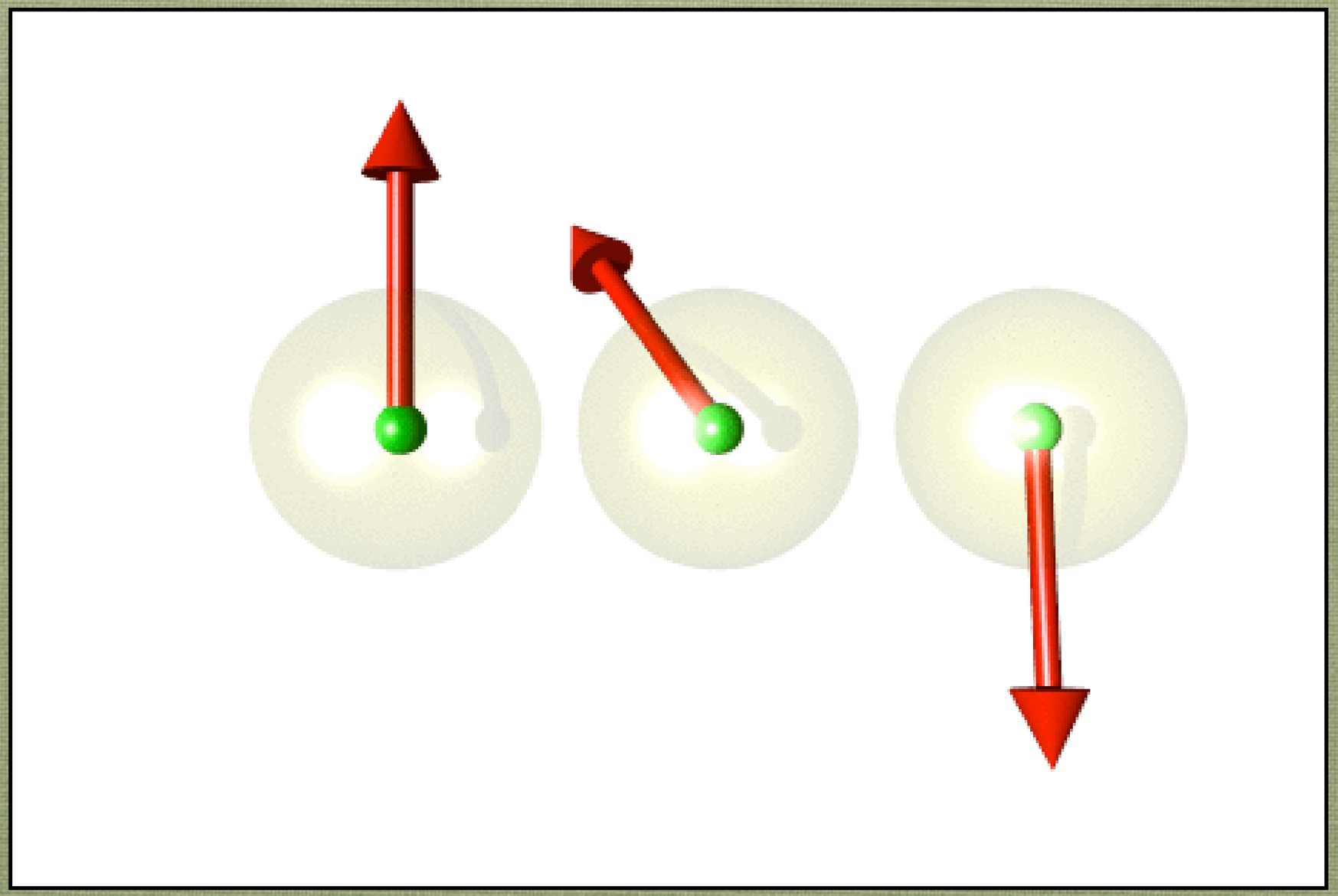


Codes Number theory

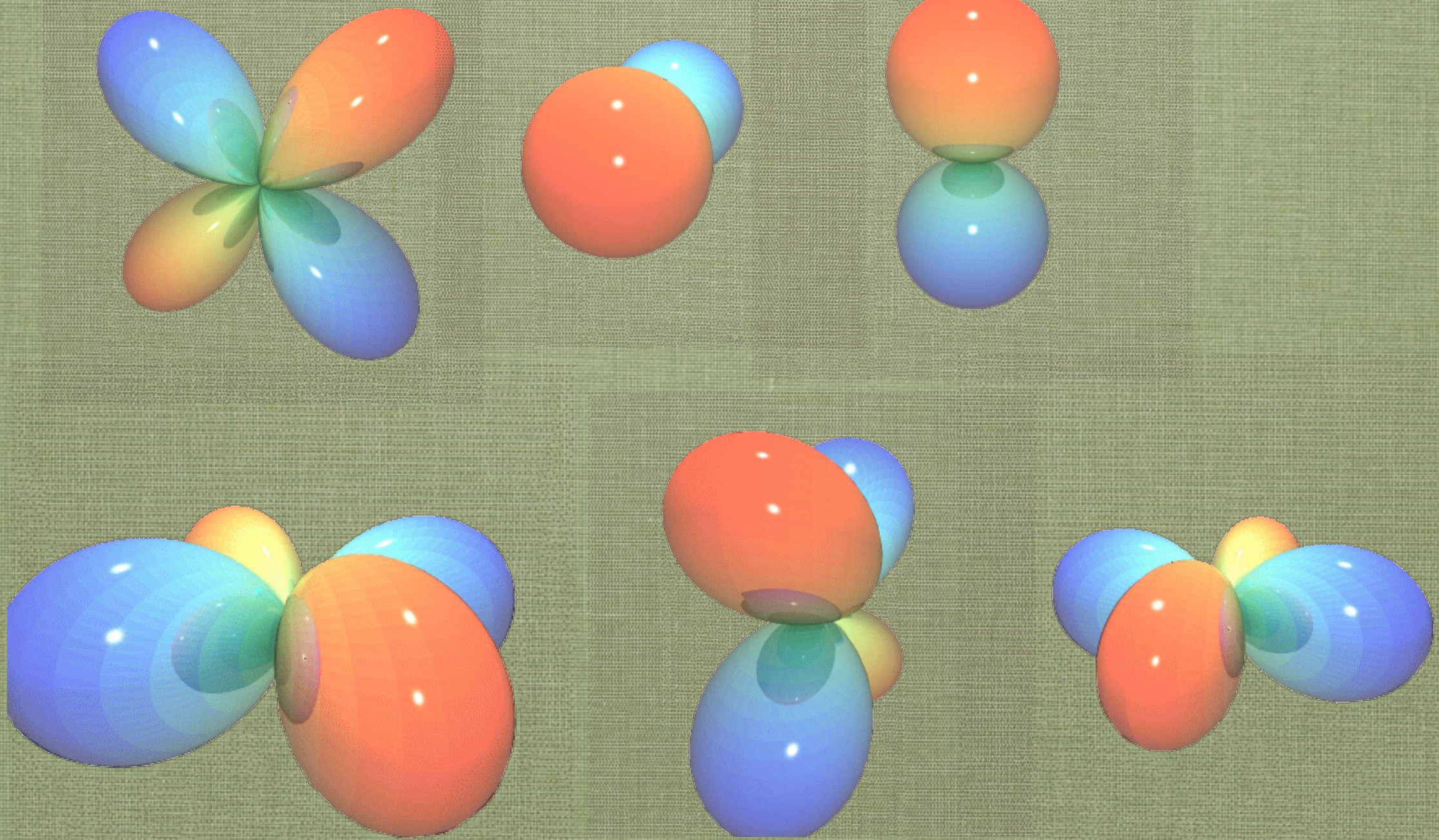
Biology


helix
1
mouse
hamster
note longer
helix 3
in hamster
C
C
clamped
region
beta
sheet
helix
2
N
N

Quantum Computing

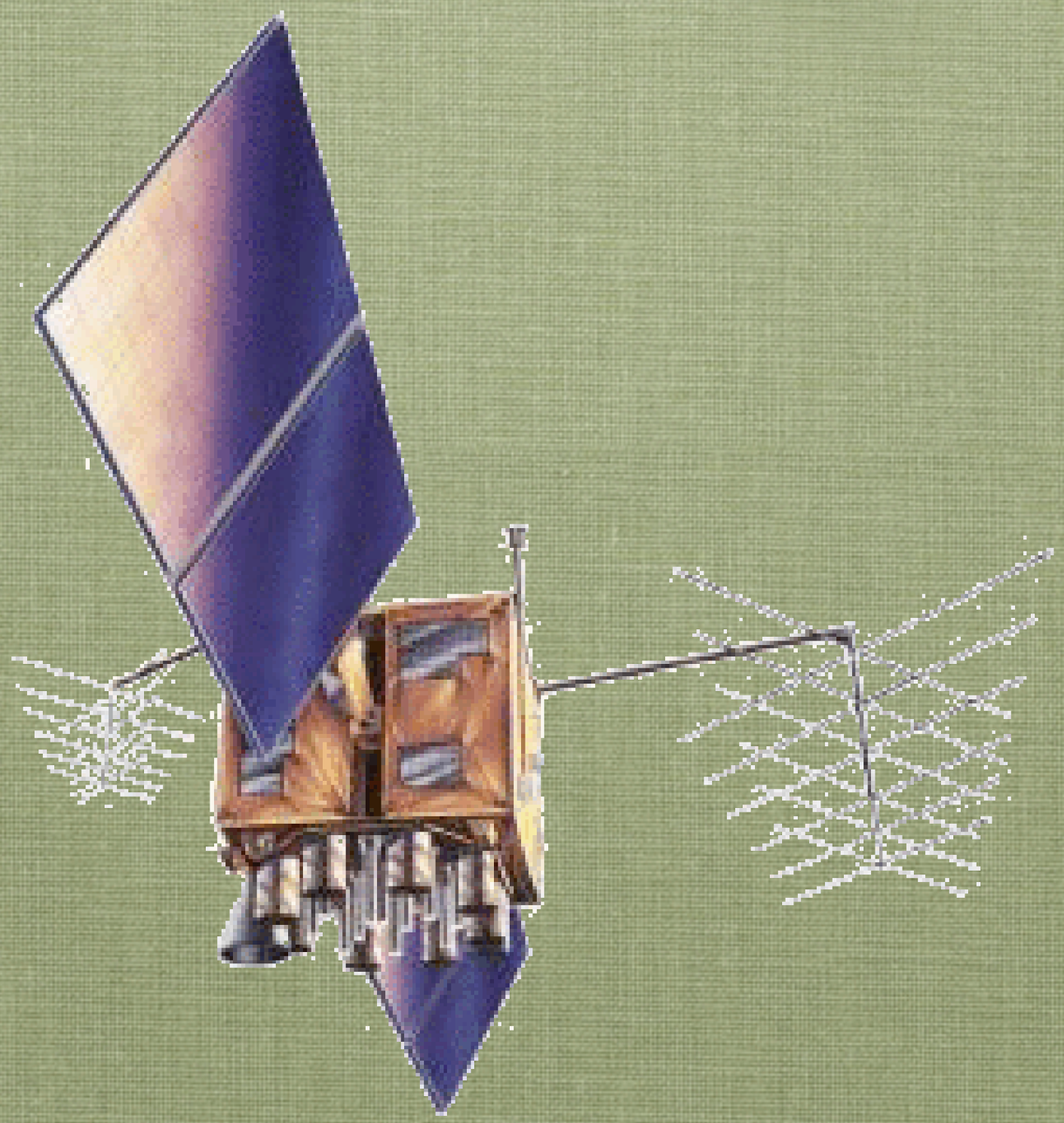


Quantum Mechanics

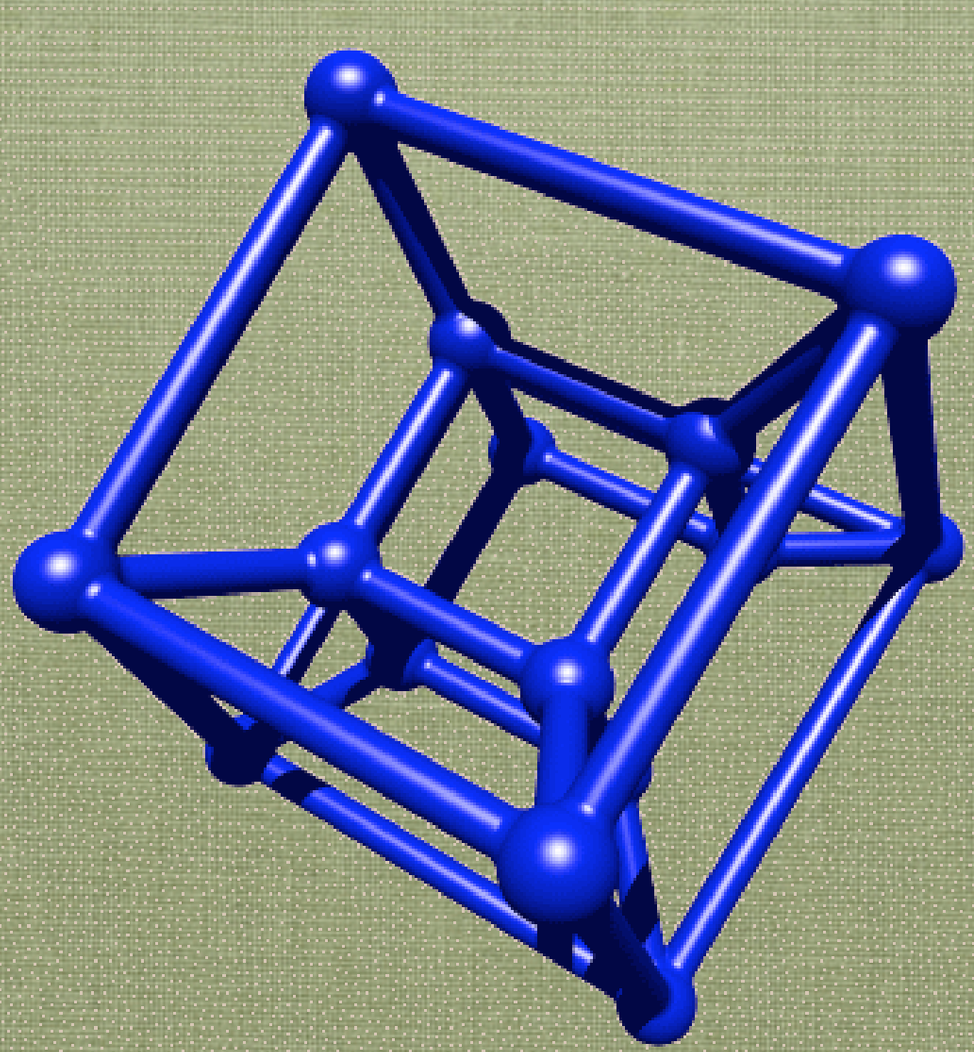


Partial Differential equations

Error Correction

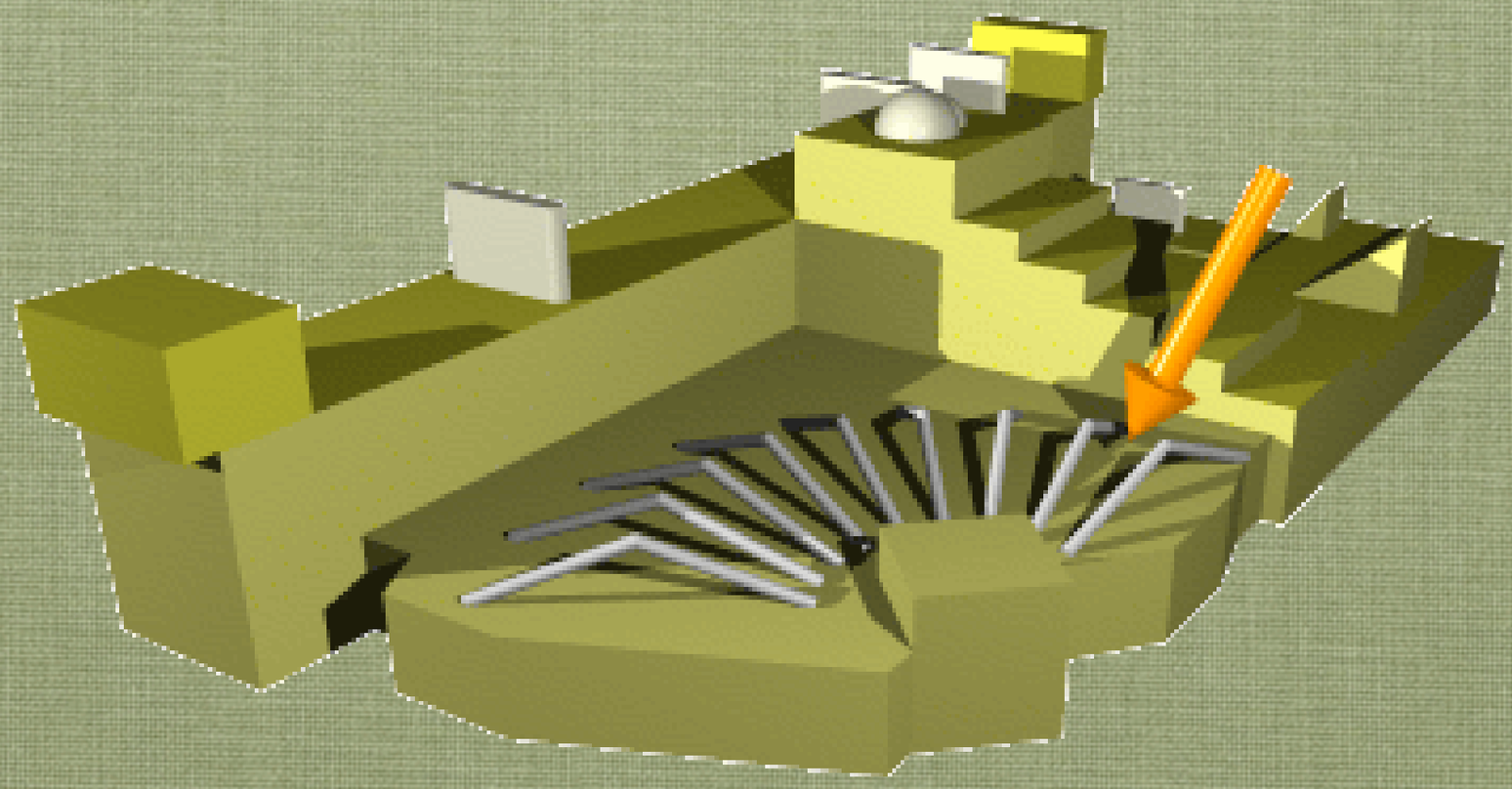


Understanding Higher dimensions



Dynamical systems

2D/3D graphics



Computergames

Ace (SA)	2
Drew (SC)	2
killamajig(DT)	1
shadow(SA)	1
Christopher 71	0
kathy	0
Night Crawler	0
Red Bandit	0

Ace (SA)

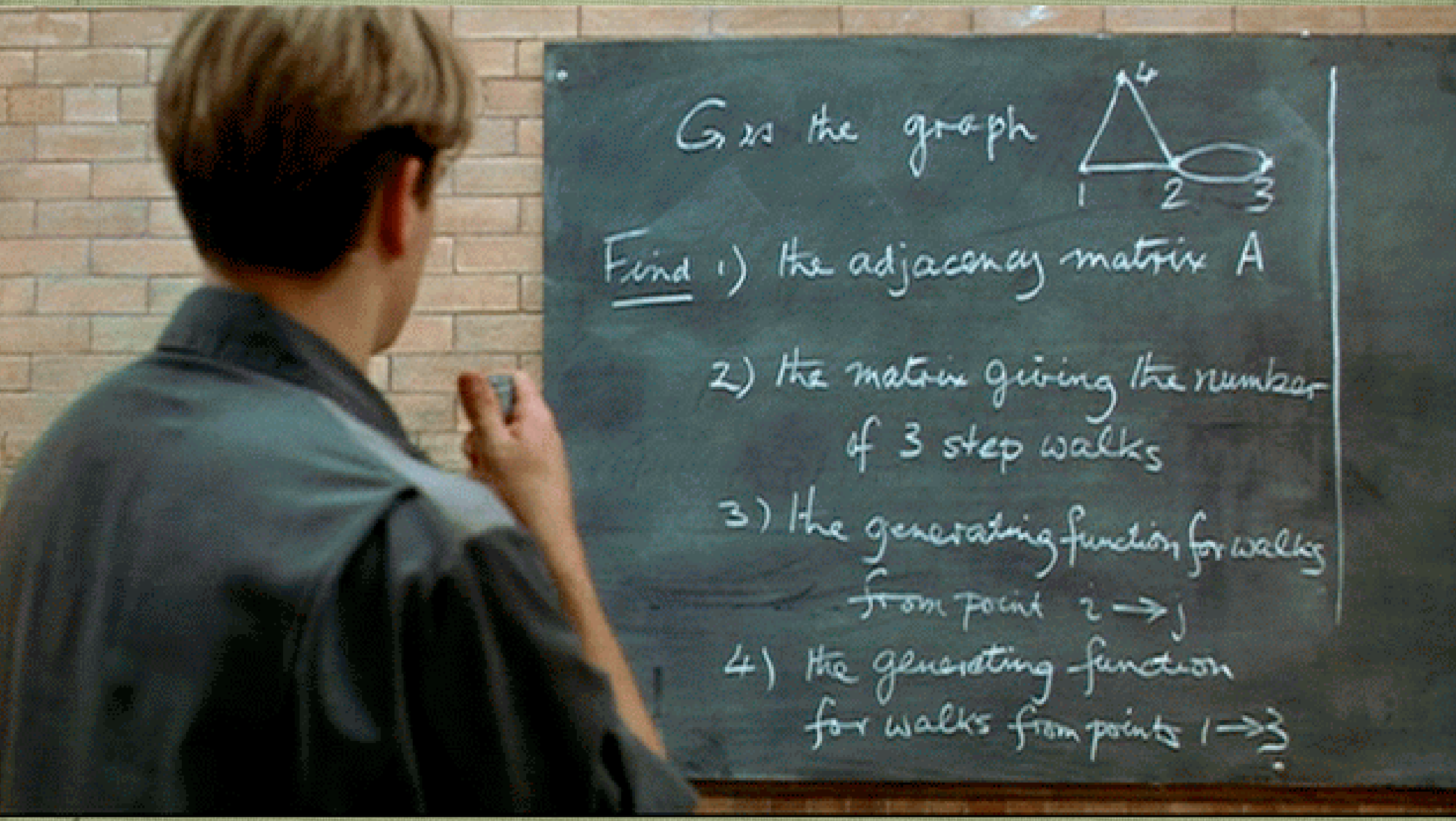
shadow(SA) Drew (SC)

A Hatsumon

(Japanese for “asking a question”,

In education used as “hook questions”)

Will Hunting's problem



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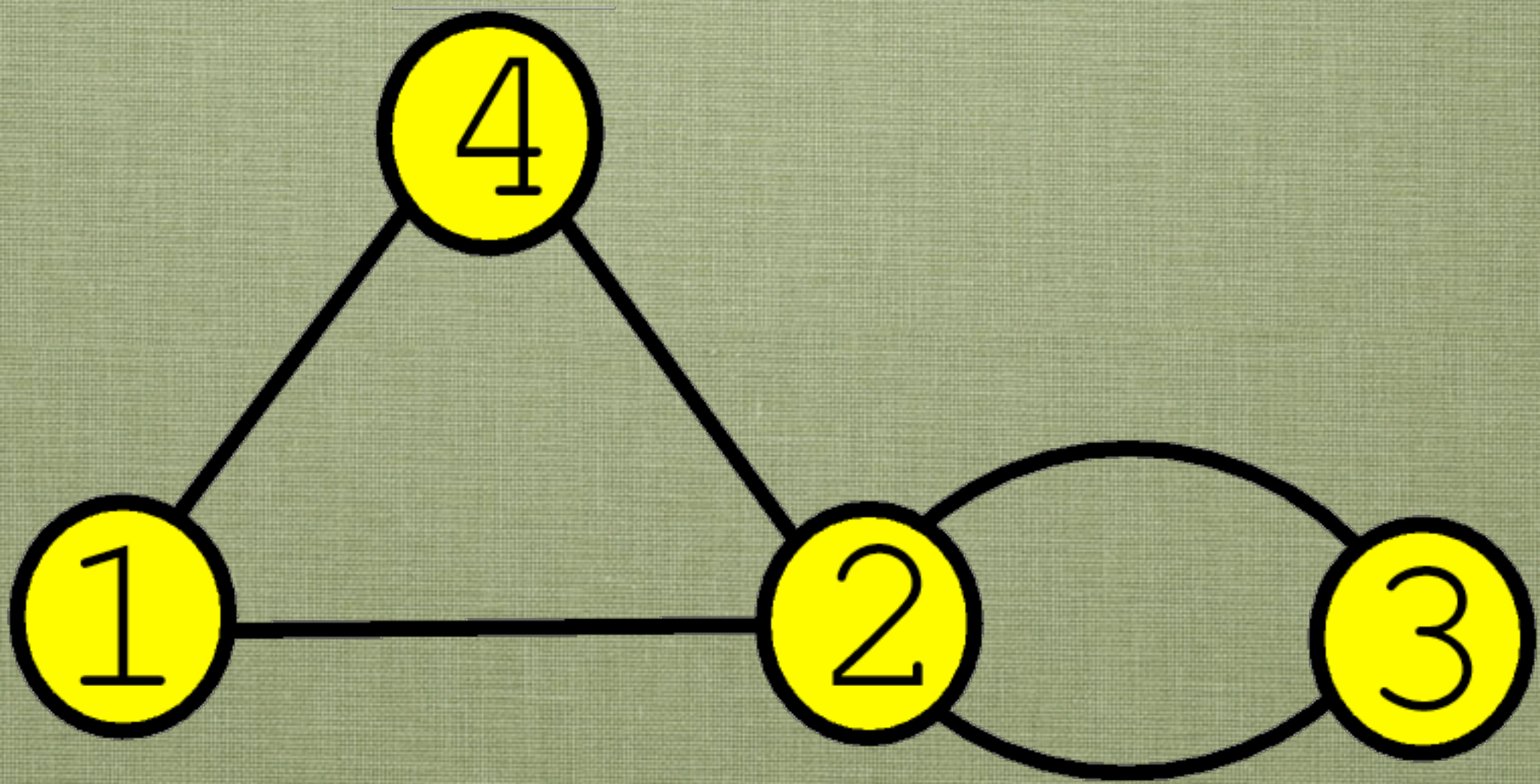
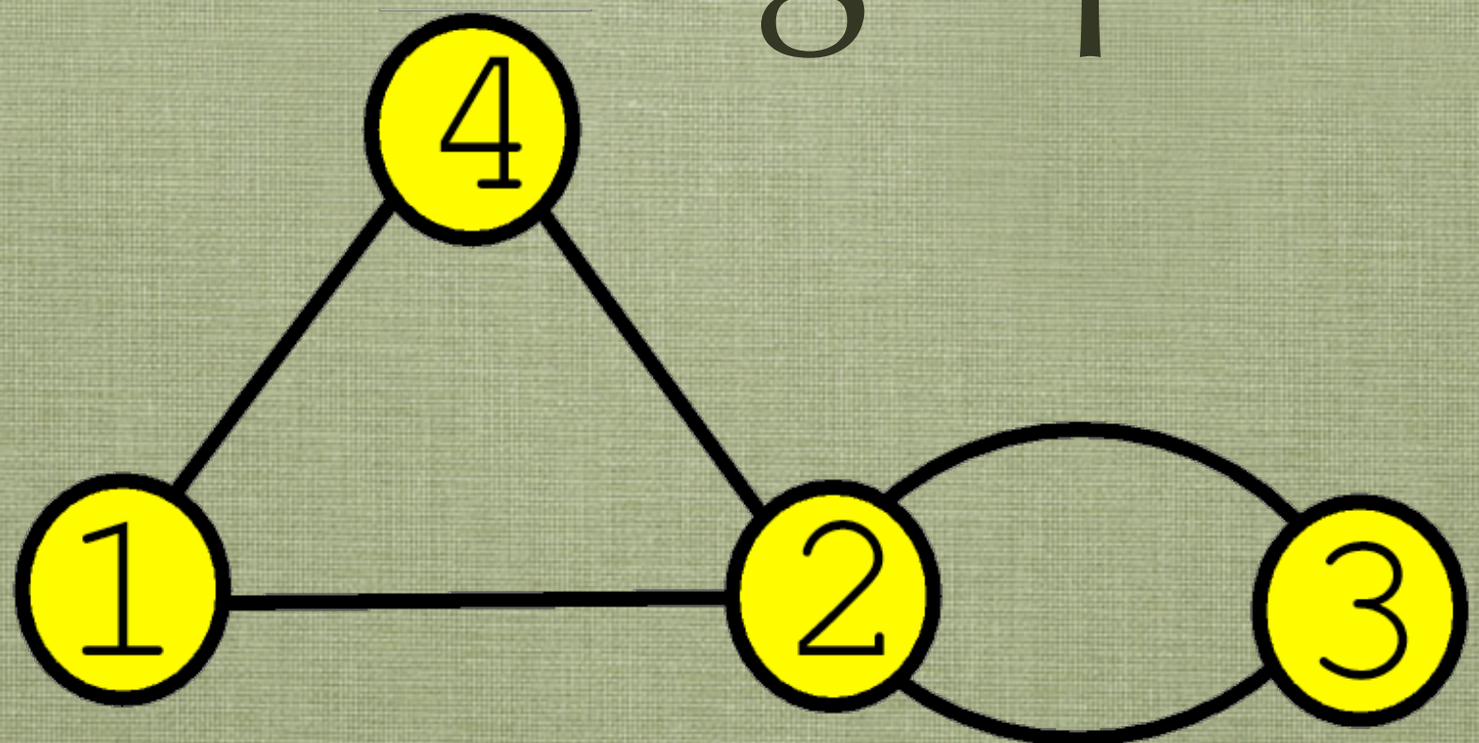
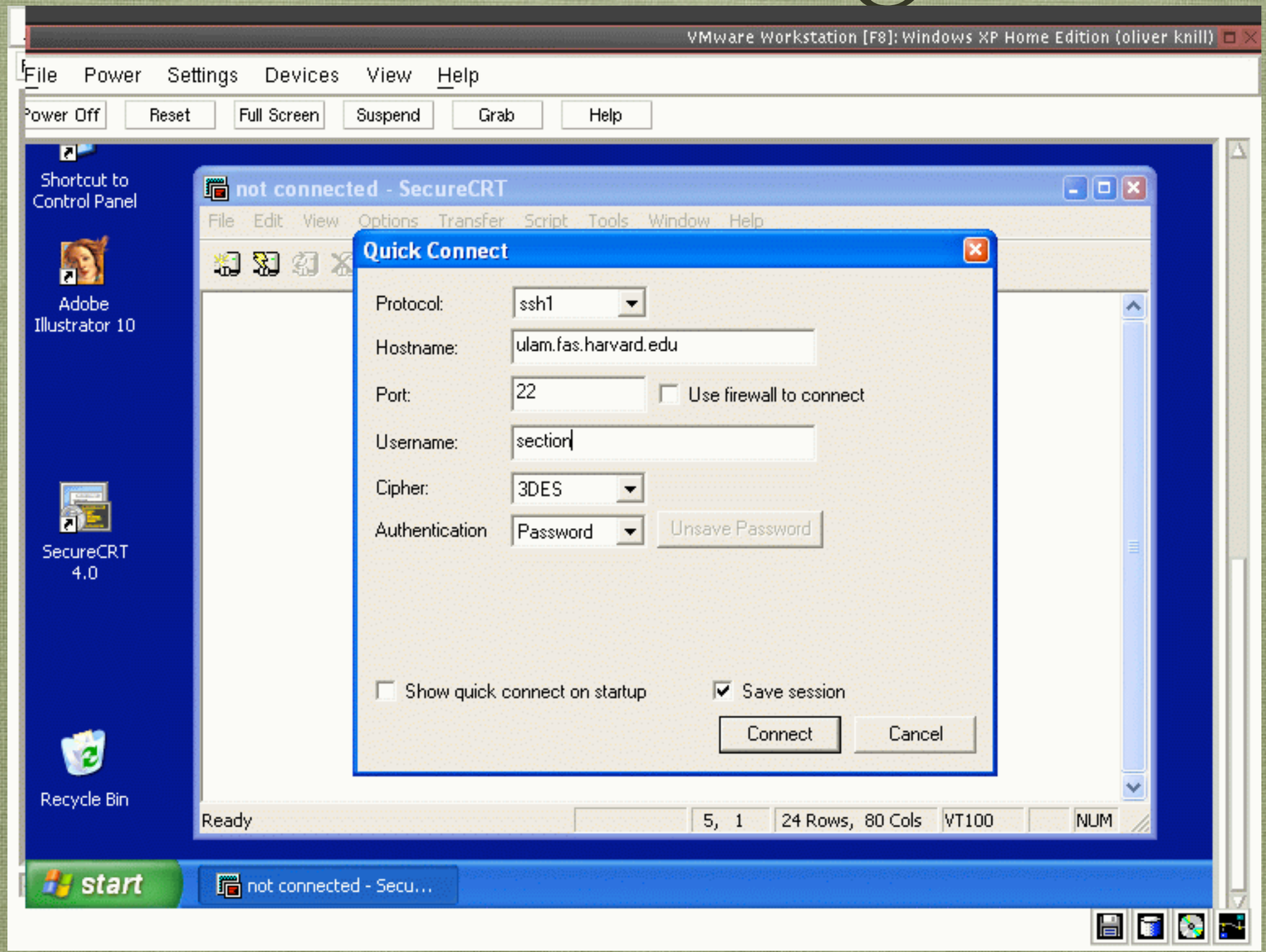


Will Hunting's problem

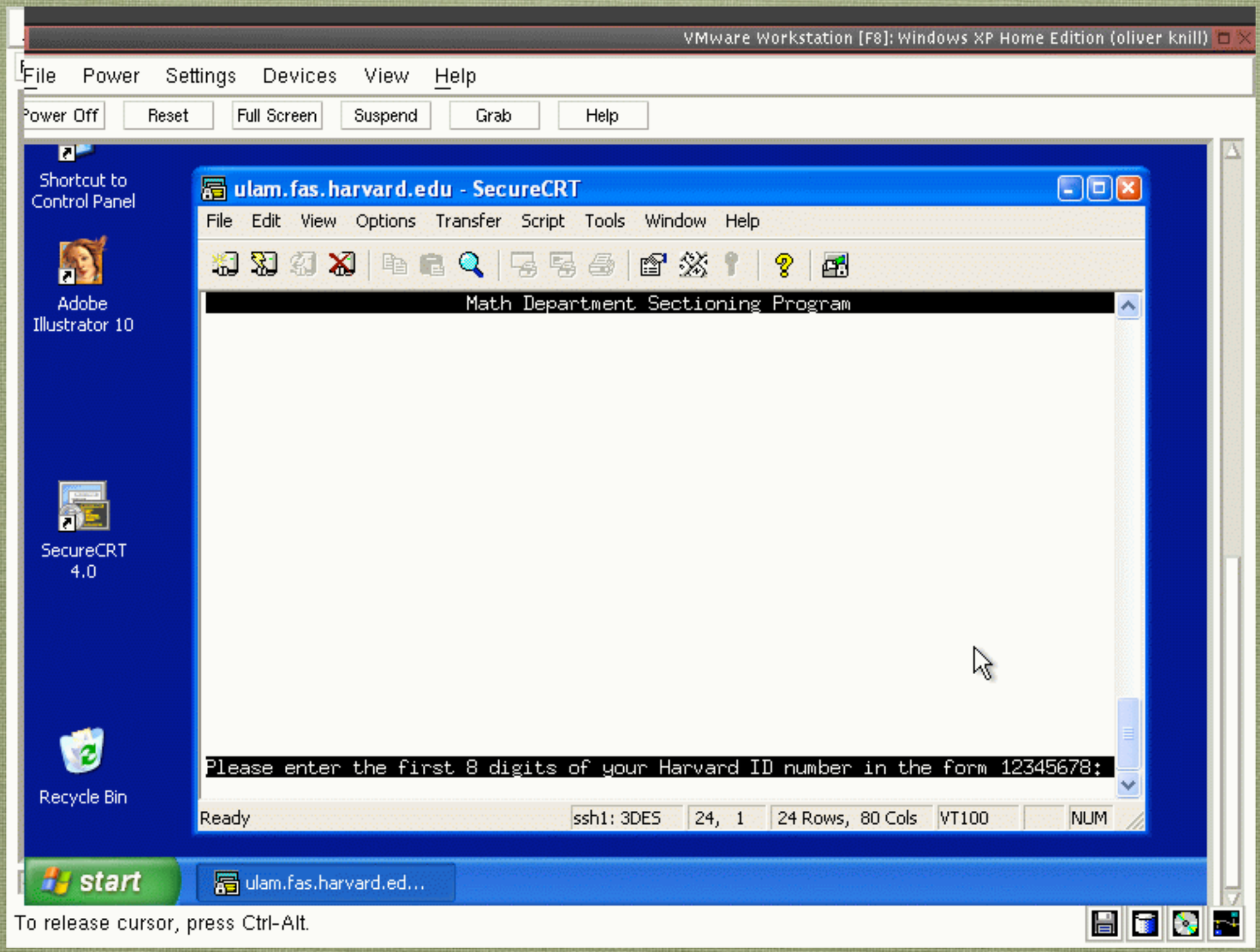


$$L = \begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 2 & 1 \\ 0 & 2 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{bmatrix}$$

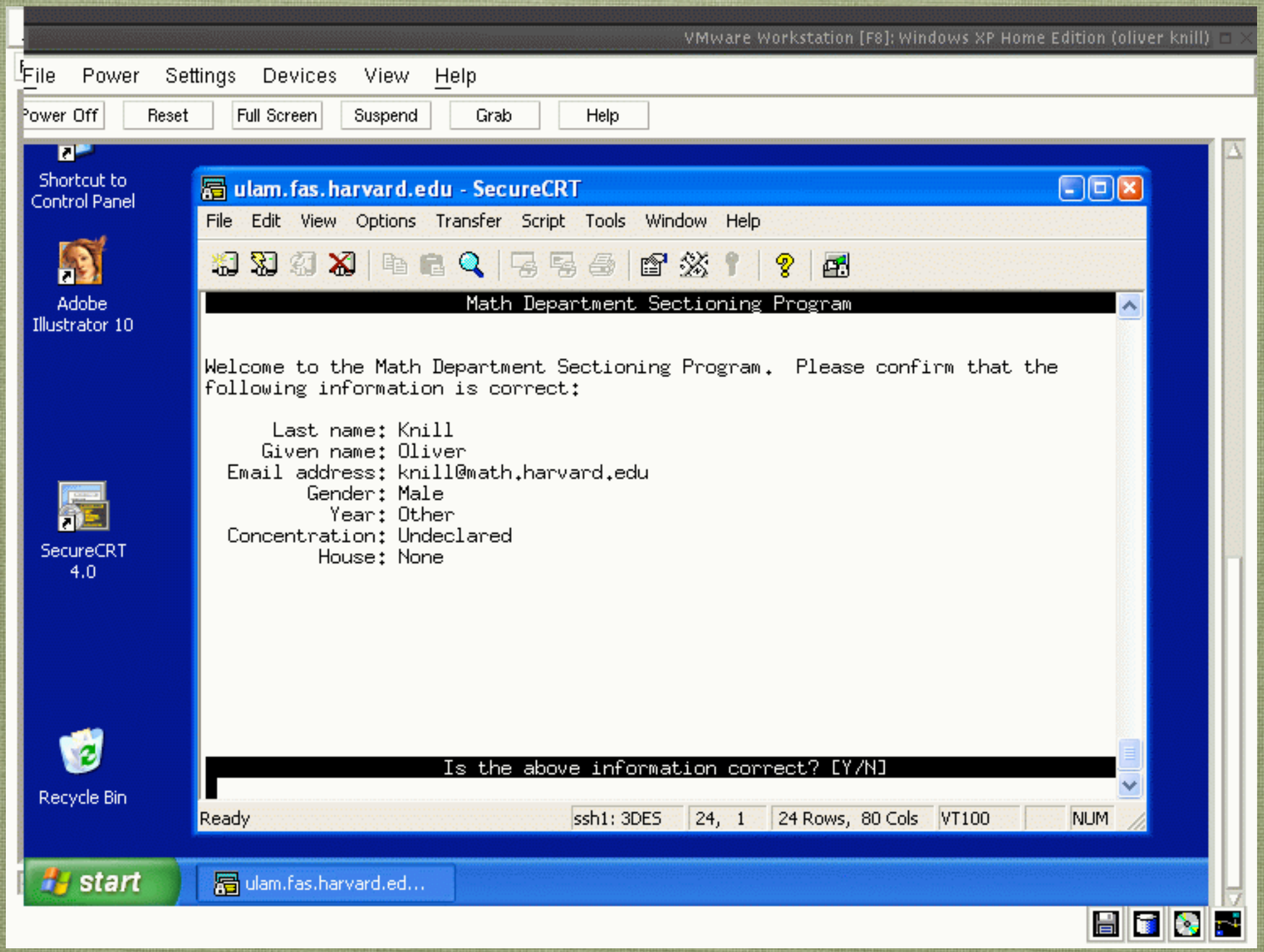
Sectioning I



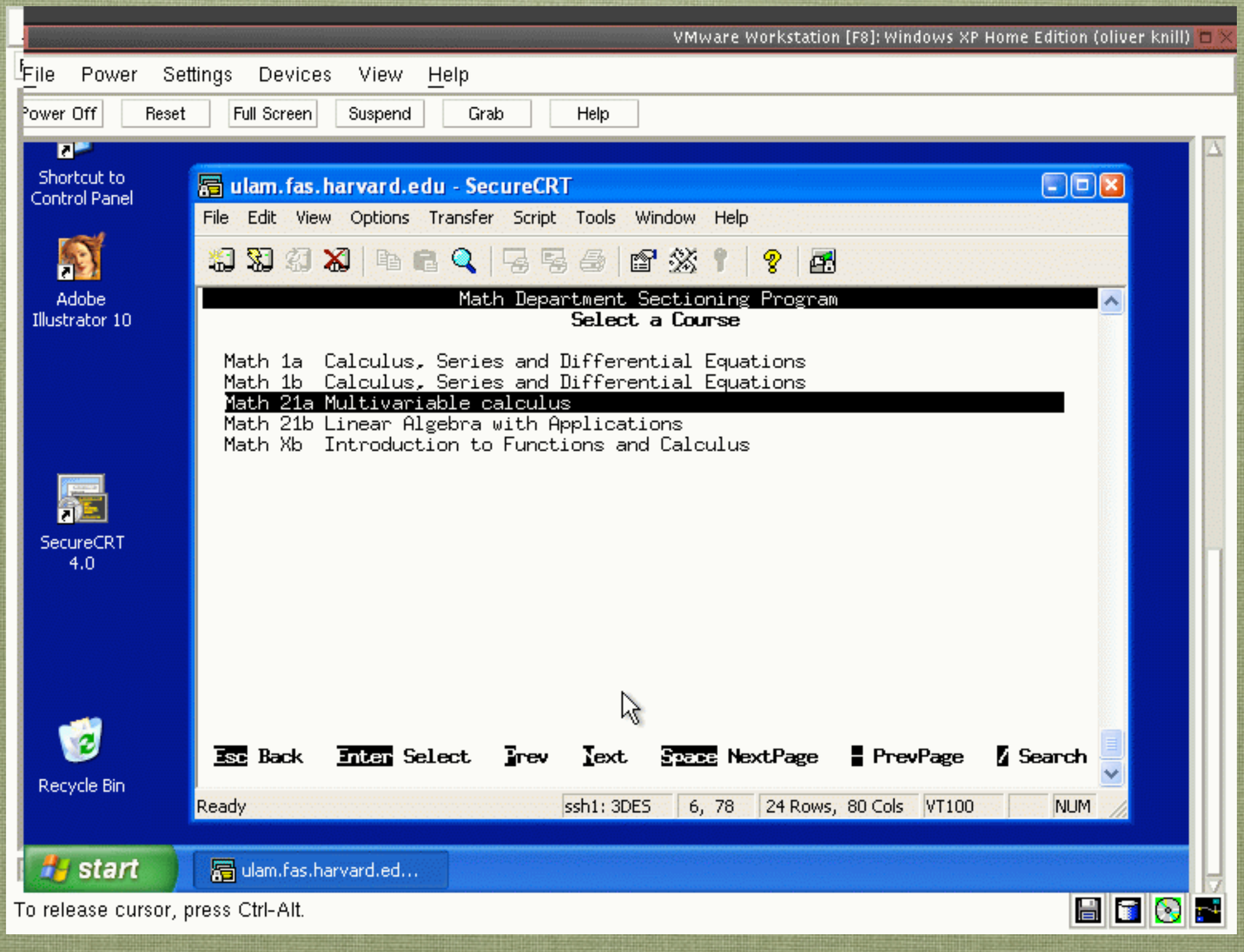
Sectioning 2



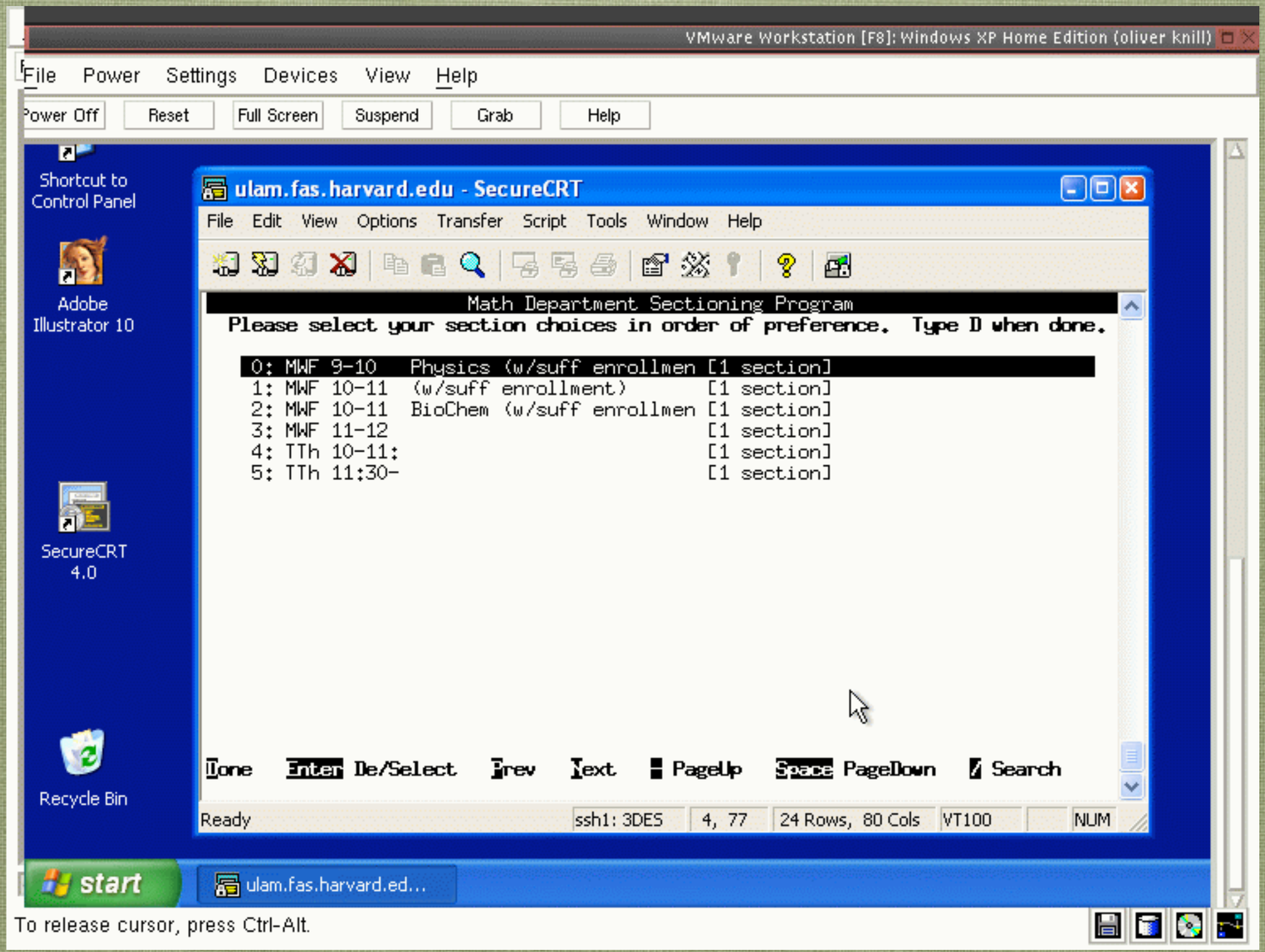
Sectioning 3



Sectioning 4



Sectioning 5



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.