Mathematical Methods

for Computer Science

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Course title: Mathematical Methods

Course lecturers:
- Dr. J. Bradley (Weeks 2-5)
- Prof. P. Harrison (Weeks 6-10)

Course code: 145

Lectures
- Mondays: 3–4pm, rm 308
- Wednesdays: 11–12 noon, rm 308 (until and inc. 7th November)
- Thursdays: 10–11 am, rm 308

Tutorials
- Thursdays: 11–12 noon OR Tuesdays 5–6pm

Number of assessed sheets: 5 out of 8
Assessed Exercises

Submission: through CATE

https://sparrow.doc.ic.ac.uk/~cate/

Assessed exercises (for 1st half of course):
1. set 8 Oct; due 18 Oct
2. set 15 Oct; due 25 Oct
3. set 22 Oct; due 8 Nov
You will find one of the following useful – no need to buy all of them:

Maths and Computer Science

- Why is Maths important to Computer Science?
- Maths underpins most computing concepts/applications, e.g.:
  - computer graphics and animation
  - stock market models
  - information search and retrieval
  - performance of integrated circuits
  - computer vision
  - neural computing
  - genetic algorithms
Highlighted Examples

- Search engines
  - Google and the PageRank algorithm
- Computer graphics
  - near photo realism from wireframe and vector representation
Searching with...
How does Google know to put Imperial’s website top?
PageRank is based on the underlying web graph
PageRank

- So where’s the Maths?
  - Web graph is represented as a matrix
  - Matrix is $9 \text{ billion} \times 9 \text{ billion}$ in size
  - PageRank calculation is turned into an eigenvector calculation
  - Does it converge? How fast does it converge?
Ray tracing with: POV-Ray 3.6
Underlying wiremesh model
How can we calculate light shading/shadow?
Computer Graphics

- Key points of model are defined through vectors
- Vectors define position relative to an origin