Methods Course Details

- 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

Recommended Books

You will find one of the following useful – no need to buy all of them:

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...

- Google
  - Google search

Searching for...

- How does Google know to put Imperial’s website top?
The PageRank Algorithm

- PageRank is based on the underlying web graph

Propagation of PageRank

PageRank

- So where’s the Maths?
  - Web graph is represented as a matrix
  - Matrix is 9 billion × 9 billion in size
  - PageRank calculation is turned into an eigenvector calculation
  - Does it converge? How fast does it converge?

Computer Graphics

- Ray tracing with: POV-Ray 3.6
How can we calculate light shading/shadow?

Key points of model are defined through vectors

Vectors define position relative to an origin

Underlying wiremesh model