

# Exam Briefing 2018

*Or Everything you need to know about the exams other than the questions*

# Introduction

- *Who am I?*

**Chris Hadley:** Clerk to the Examiners in 1A (among many other things)

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- *Why are we here?*

To try and make the whole process a bit less scary

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- *Why are we here?*

To try and make the whole process a bit less scary

- *Who are you?*

- |                                 |                             |
|---------------------------------|-----------------------------|
| • 79 Computer Science           | <b>Papers 1&amp;2&amp;3</b> |
| • 9 Computer Science & NST      | <b>Papers 1&amp;2</b>       |
| • 2 Computer Science & SocPsych | <b>Papers 1&amp;2</b>       |
| • 11 Computer Science & Maths   | <b>Papers 1&amp;2</b>       |
| • 60 NST                        | <b>Paper 1 only</b>         |
| • 1 PBT                         | <b>Paper 1 only</b>         |

# Practical Matters – When?

## CST ONLY!

### Computer Science Tripos, Part IA, 2018 - CST0

Thursday 31 May	09.00-12.00	MAT0/1	Mathematics Paper 1	Mill Lane Lecture-rooms
Friday 01 Jun	13.30-16.30	MAT0/2	Mathematics Paper 2	Mill Lane Lecture-rooms
Monday 04 Jun	13.30-16.30	1	Computer science Paper 1	Corn Exchange
Tuesday 05 Jun	09.00-12.00	PBS1	Introduction to psychology	Sidgwick Avenue Lecture-rooms
Tuesday 05 Jun	13.30-16.30	2	Computer science Paper 2	Corn Exchange
Thursday 07 Jun	10.00-17.00	EART/P	Earth Sciences (Details on actual timings will be supplied by the Department)	Department of Earth Sciences
Thursday 07 Jun	13.30-16.30	3	Computer Science Paper 3 (new regs.)	Corn Exchange
Saturday 09 Jun	13.30-16.30	PSIC/1	Physics	Sports Hall, Cambridge Sports Centre
Monday 11 Jun	09.00-12.00	MATH/1	Mathematics	Sports Centre Studio, Cambridge Sports Centre
Monday 11 Jun	13.30-16.30	CHEM/1	Chemistry	Sports Hall, Cambridge Sports Centre
Wednesday 13 Jun	09.00-12.00	MATH/2	Mathematics	Sports Centre Studio, Cambridge Sports Centre

Note that this timetable is for CST only, venues may be different for others.

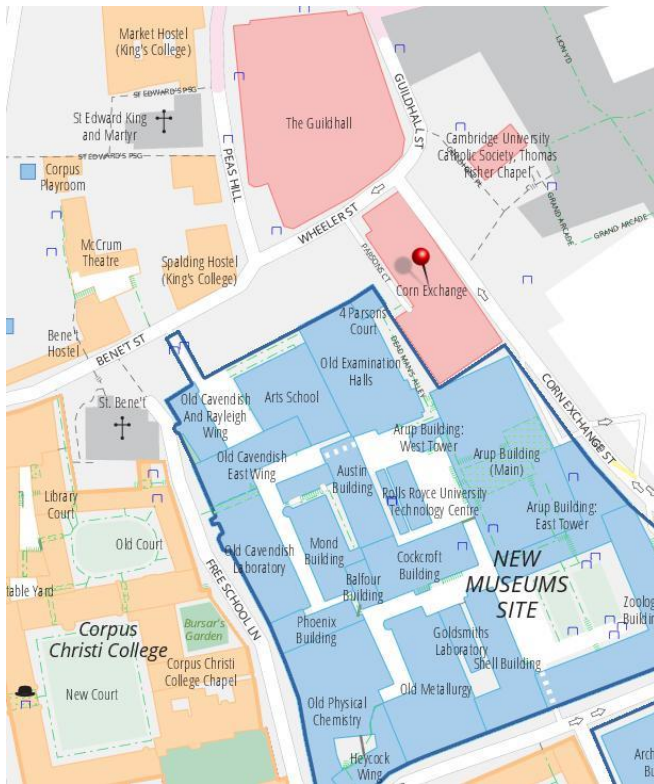
This should have been sent to you on your examination confirmation form (yellow card)

It's at:

[www.cambridgestudents.cam.ac.uk/your-course/examinations/all-students-timetable](http://www.cambridgestudents.cam.ac.uk/your-course/examinations/all-students-timetable)

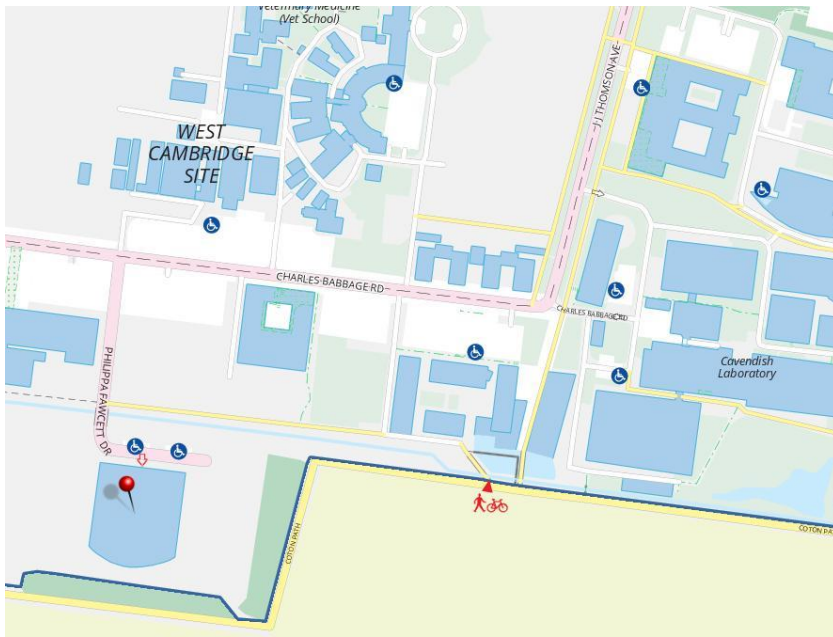
# Practical Matters – Where?

- Where? Papers 1, 2 and 3 = Corn Exchange



# Practical Matters – Where?

- Where? Most other papers – Sports Centre





# Practical Matters – What?

UNIVERSITY OF CAMBRIDGE COMPUTER LABORATORY

## Part IA: Structure of Papers 1 and 2 in 2018

### Paper 1

#### Section A

*Attempt 1 question*

1. Foundations of Computer Science
2. Foundations of Computer Science

#### Section B

*Attempt 1 question*

3. Object-Oriented Programming
4. Object-Oriented Programming

#### Section C

*Attempt 1 question*

5. Numerical Methods
6. Numerical Methods

#### Section D

*Attempt 2 questions*

7. Algorithms
8. Algorithms
9. Algorithms
10. Algorithms

*Attempt five questions on each paper.*

### Paper 2

#### Section A

*Attempt 1 question*

1. Digital Electronics
2. Digital Electronics

#### Section B

*Attempt 1 question*

3. Operating Systems
4. Operating Systems

#### Section C

*Attempt 1 question*

5. Software and Security Engineering
6. Software and Security Engineering

#### Section D

*Attempt 2 questions*

7. Discrete Mathematics
8. Discrete Mathematics
9. Discrete Mathematics
10. Discrete Mathematics



# Practical Matters – What (for some of you)? CST ONLY!

UNIVERSITY OF CAMBRIDGE COMPUTER LABORATORY

Part IA (75%), Part IB (50%): Structure of Paper 3 in 2018

## Paper 3

### Section A

*Attempt 1 question*

1. Databases
2. Databases

### Section B

*Attempt 1 question*

3. Introduction to Graphics
4. Introduction to Graphics

### Section C

*Attempt 1 question*

5. Interaction Design
6. Interaction Design

### Section D

*Attempt 2 questions*

7. Machine Learning and Real-world Data
8. Machine Learning and Real-world Data
9. Machine Learning and Real-world Data

*Attempt five questions on the paper.*

# Practical Matters – What if I answer more questions?

I am asked this question every year, hence this slide.

All questions submitted are marked, but only 5 marks per paper will count.

Which 5 are entirely **at the discretion of the examiners.**

The marks chosen will obey the sectioning rules (ie 1 from Section A, etc), and will not necessarily be the highest marks.

It is the opinion of the examiners that you are better off spending any extra time you feel you might have by attempting to improve your 5 answers than by starting and submitting an extra question.

# Practical Matters – Who's who?

- Supervisor
- Invigilators & Assistants
- Examiners – only present for 1<sup>st</sup> 30mins, but you can ask questions after that.
- Proctor (rare)
- (not in the room) Assessors

# Practical Matters – What can I ask the examiners?

- You can't ask questions like this:
  - ❖ What is the answer to Question 3?
  - ❖ Is the answer to Question 3 “x”?
- But you can ask, for example:
  - ✓ Is this question correct as printed?

$$\textit{Simplify } F = A.\bar{B}.C.\bar{D}.E + A.C.D + A.C.\bar{F}.G.\bar{H} + A.B.C.\bar{D}.E + A.C.D.\bar{E} + \bar{E}.\bar{H}$$

# Practical Matters – Things to take with you

- Id

# Practical Matters – Things to take with you

- Id
- Clothes

# Practical Matters – Things to take with you

- Id
- Clothes
  - 11. Candidates shall be dressed decently and not in a manner that is likely to create a disturbance in the examination room, or to distract the attention of other candidates.
- Anything else?



# Practical Matters – Things *NOT* to take with you

- Mobile phone

# Practical Matters – Things *NOT* to take with you

- Mobile phone - £50 fine !

- Food

4. A candidate may take a small screw-top bottle of water to his or her desk for consumption during an examination session provided that no disturbance is thereby caused to other candidates. Except with the written consent of the Secretary of the Board of Examinations no other items of food or drink may be taken into an examination room. A Supervisor, Invigilator, or Examiner has authority to deprive a candidate of unauthorized items until the examination session is ended.

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- Books or papers
- Any means of data storage or retrieval
- Any radio or audio equipment

# Practical Matters - Calculators

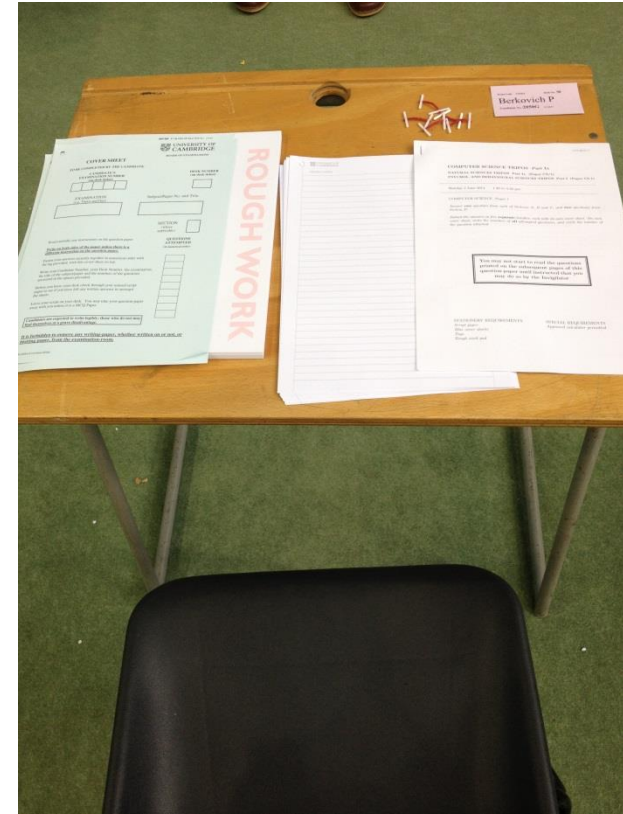
- You are allowed to take an approved calculator into
  - Computer Science papers 1, 2 & 3
  - All NatSci papers except NST Maths
  - Some Psychology and Behavioural Science papers (Paper PBS2 only)
- You are **NOT** allowed to take a calculator into
  - Any NatSci Maths papers
  - Any papers borrowed from the Mathematical Tripos
- Approved calculators must be marked by the Department (go to Student Administration)
- Only the following will be approved: Casio fx 991, fx 115, fx 570 (any versions)

# Practical Matters – what happens when

- Aim to be outside 30-15 mins early. You may be admitted before the advertised time. (You will be allowed in up to 30 mins late)
- You will only see the exam cover. An invigilator will tell you when you can open the exam paper and start.
- You should read the whole paper before you start writing.
- Allow roughly 36mins per question ( $180 \div 5$ )
- There will be a 5 minute warning before the end of the exam
- You must stop writing when instructed at the end of the exam.
- You may then fill in the cover sheet (if you haven't already).
- You may leave once your paper is collected. (You may leave earlier but not in the first 30 mins)

# Practical Matters – the desk

- On your desk will be:
  - The exam paper
  - A stock of writing paper
  - A stock of clearly marked rough working paper (probably!)
  - A card with your name and examination number, and the number of your desk
  - Some cover sheets
  - Some tags



# Practical Matters – the cover of the paper

CST.2012.1.1

COMPUTER SCIENCE TRIPOS Part IA

NATURAL SCIENCES TRIPOS Part IA (Paper CS/1)

POLITICS, PSYCHOLOGY, AND SOCIOLOGY TRIPOS Part I (Paper 9)

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Monday 4 June 2012 1.30 to 4.30

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COMPUTER SCIENCE Paper 1

Answer **five** questions.

At least **one** question from each section is to be answered.

Submit the answers in five **separate** bundles, each with its own cover sheet. On each cover sheet, write the numbers of **all** attempted questions, and circle the number of the question attached.

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator



# Practical Matters – Cover sheet

## COVER SHEET



Candidate Number	<table border="1"><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>X</td></tr></table>	1	2	3	4	X			
1	2	3	4	X					
Desk Number	<table border="1"><tr><td>100</td></tr></table>	100							
100									
Examination (e.g. Tripos and Part)	<table border="1"><tr><td>COMPUTER SCIENCE1A</td></tr></table>	COMPUTER SCIENCE1A							
COMPUTER SCIENCE1A									
Subject / Paper Number and Title	<table border="1"><tr><td>PAPER 1</td></tr></table>	PAPER 1							
PAPER 1									
Section (where applicable)	<table border="1"><tr><td>A</td></tr></table>	A							
A									
Questions Attempted	<table border="1"><tr><td>①</td><td>3</td><td>5</td><td>7</td><td>9</td><td></td><td></td><td></td></tr></table>	①	3	5	7	9			
①	3	5	7	9					

### During the examination

- You must not have any electronic device unless indicated on the question paper
- Read carefully the instructions on the question paper
- Ask an invigilator if you need extra paper
- Write legibly

### After the examination

- Complete all the sections above
- Number your pages, and fasten them to this cover sheet with the tag provided
- You may take away your question paper, unless instructed otherwise
- You may not take away any stationery

# Practical Matters – Cover sheet

Some people find the cover sheet confusing because the instructions telling you how to fill it in are on the front of the exam paper, NOT on the cover sheet itself. This is because all exams use the same cover sheet, and some subjects want them filled in differently.

To emphasise – **We want a cover sheet per question** (ie 5)

We **do not** want a cover sheet per paper (ie 1), or a cover sheet per section (ie 4)

Please fill in the numbers of *all questions attempted* on **all** cover sheets. This is so we can tell if a question answer gets lost!

**Please write numbers legibly on the cover sheet**

Also – **don't write your name on your answers or on the cover sheet - candidate number only** (we use anonymous marking)

# Practical Matters – Illness/incapacity/mitigating circumstances

- If a problem occurs in the time before the exams that is likely to disturb your revision or performance in the exam itself **tell your Tutor asap.**
- Your college may submit a **warning letter**, which will be used as evidence if you apply for an **allowance** after the exams. (An allowance is a mark or class adjustment granted in certain circumstances, in particular on account of “*illness or other grave cause*”.)
- If it is a medical matter see a GP as the GP may be asked to provide a note
- If a problem occurs on the day **contact your college Porters’ Lodge.**
- If a problem occurs in the exam hall put your hand up and **inform an invigilator.**

# After the exam – What happens?

- Sorting
- Marking
- Checking
- Practical marks

All of you should have gained the full set of “units of assessed course work” (aka *ticks*), as specified in the Head of Department’s notices.

The Marking and Classing document says:

“Mark penalties will be applied to act as a deterrent to missing a tick. The Part IA Examiners are supplied with a final tick list. Each missing tick will receive a penalty of 10 marks (10% of a paper). The maximum penalty is 100 marks (one full paper).”

We don’t do this for NST (or PBT)

# After the exam - Norm referencing

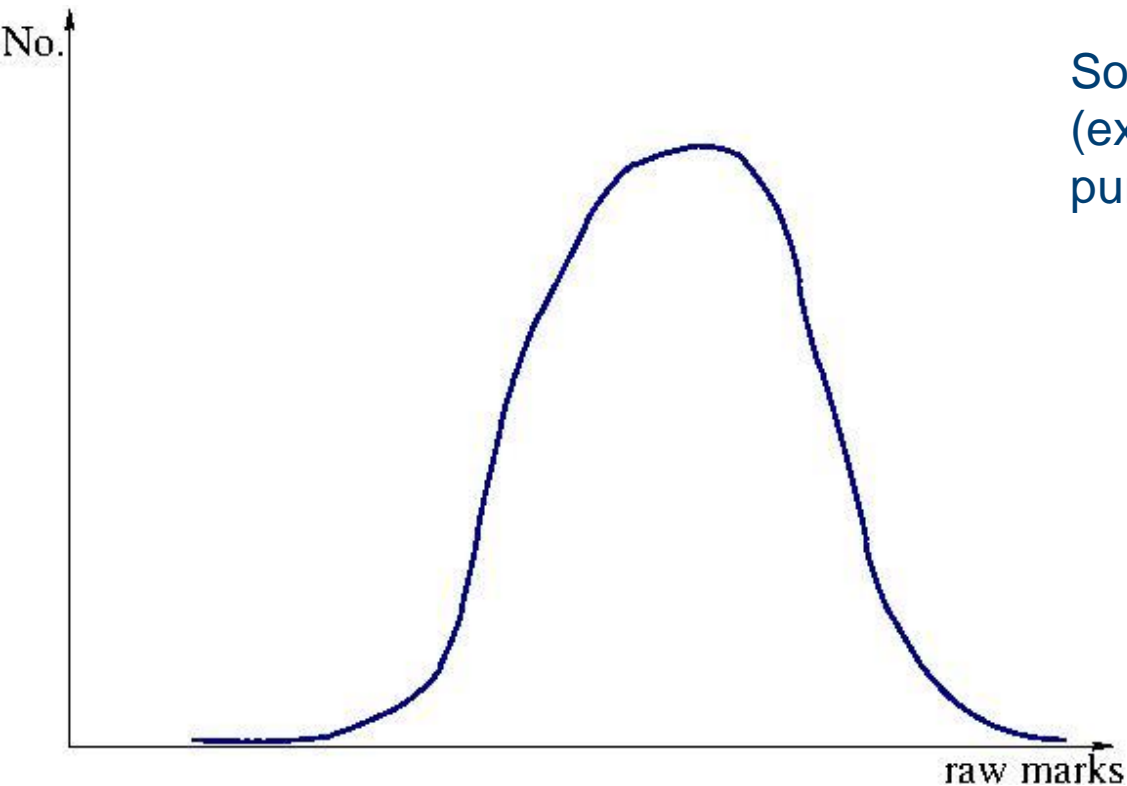
A problem: We need to add up the marks on your various papers.

So what's the problem – can't we just add up the raw marks?

Yes – but it wouldn't be fair.

Let's look at the mark distribution for the whole cohort for a random paper

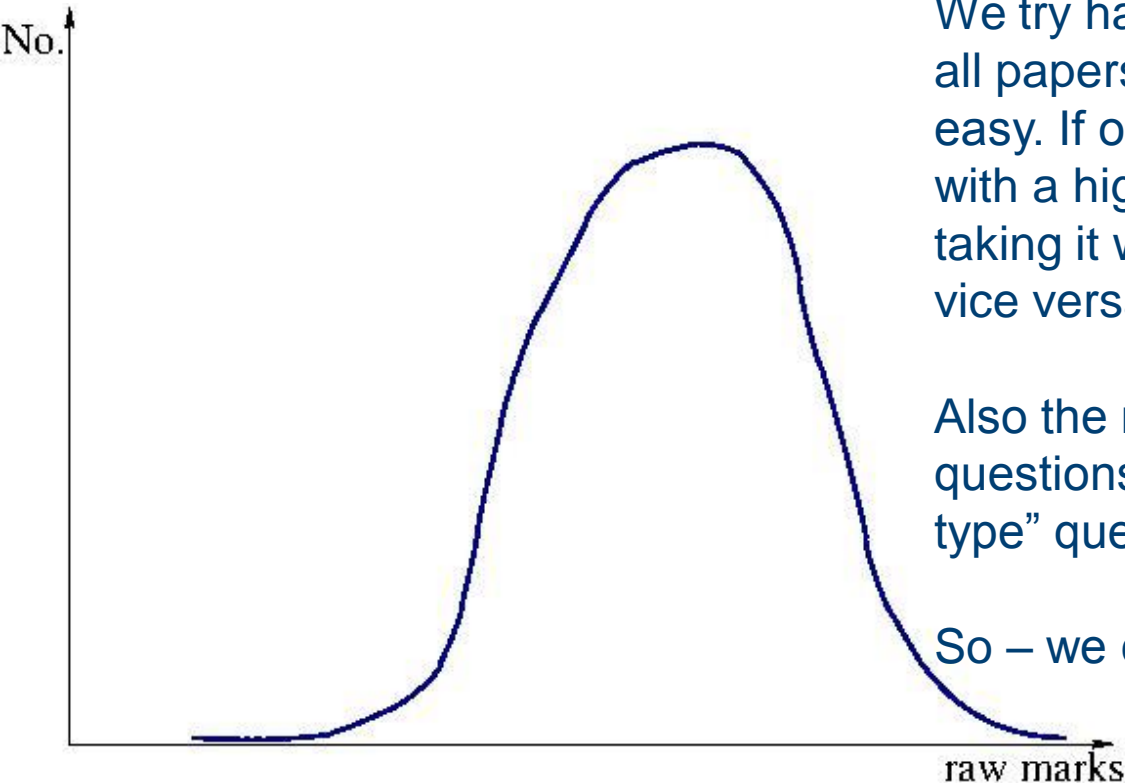
# After the exam - Norm referencing



Some distribution a little bit like this  
(exaggerated for illustrative  
purposes)



# After the exam - Norm referencing

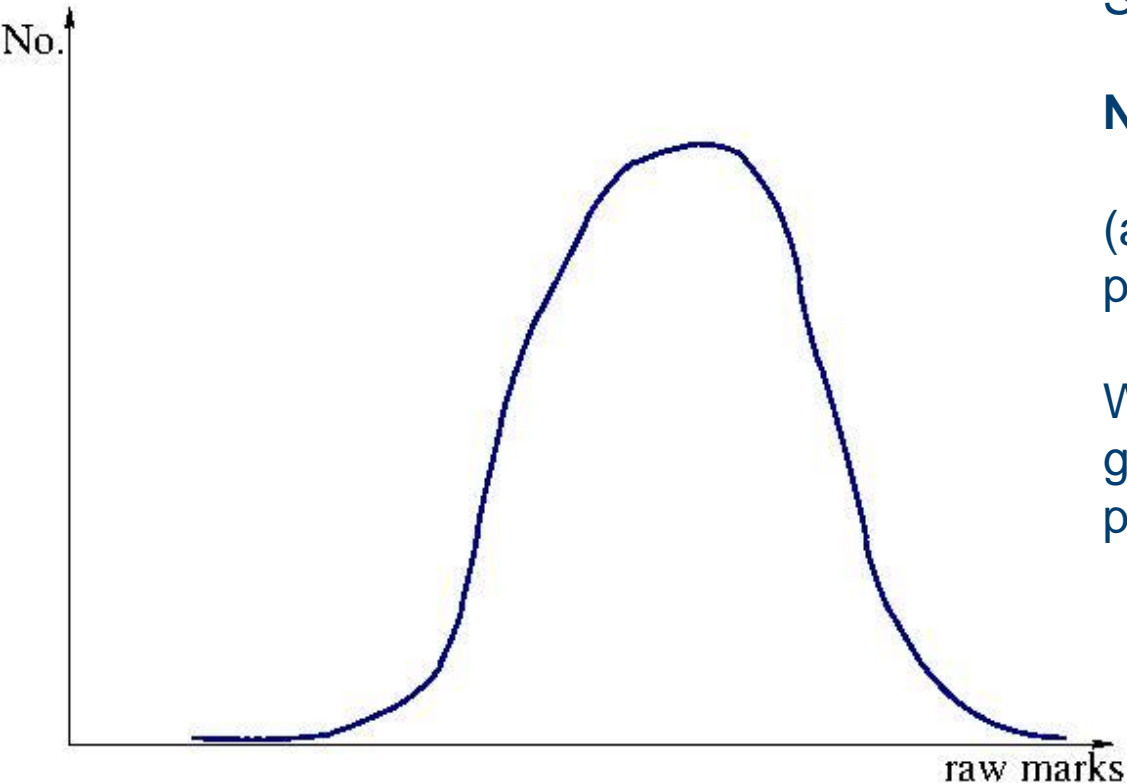


We try hard to make all questions and thus all papers equally difficult, but this is not easy. If one paper turned out to be “easier”, with a higher overall distribution, the people taking it would be unfairly advantaged (and vice versa).

Also the mark distribution for “essay-type” questions tends to be different from “maths-type” questions.

So – we can’t just add up the raw marks

# After the exam - Norm referencing



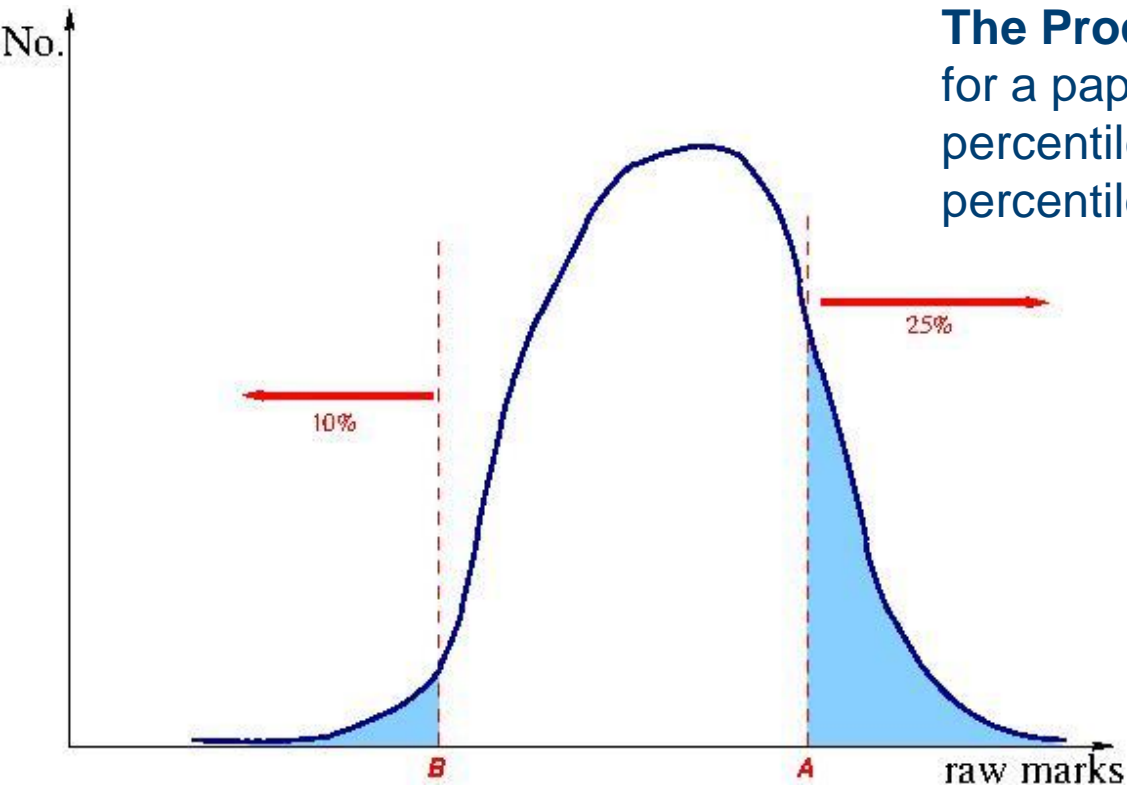
So what can we do about it?

**Normalise the paper marks**

(aka norm referencing, aka linear piecewise scaling)

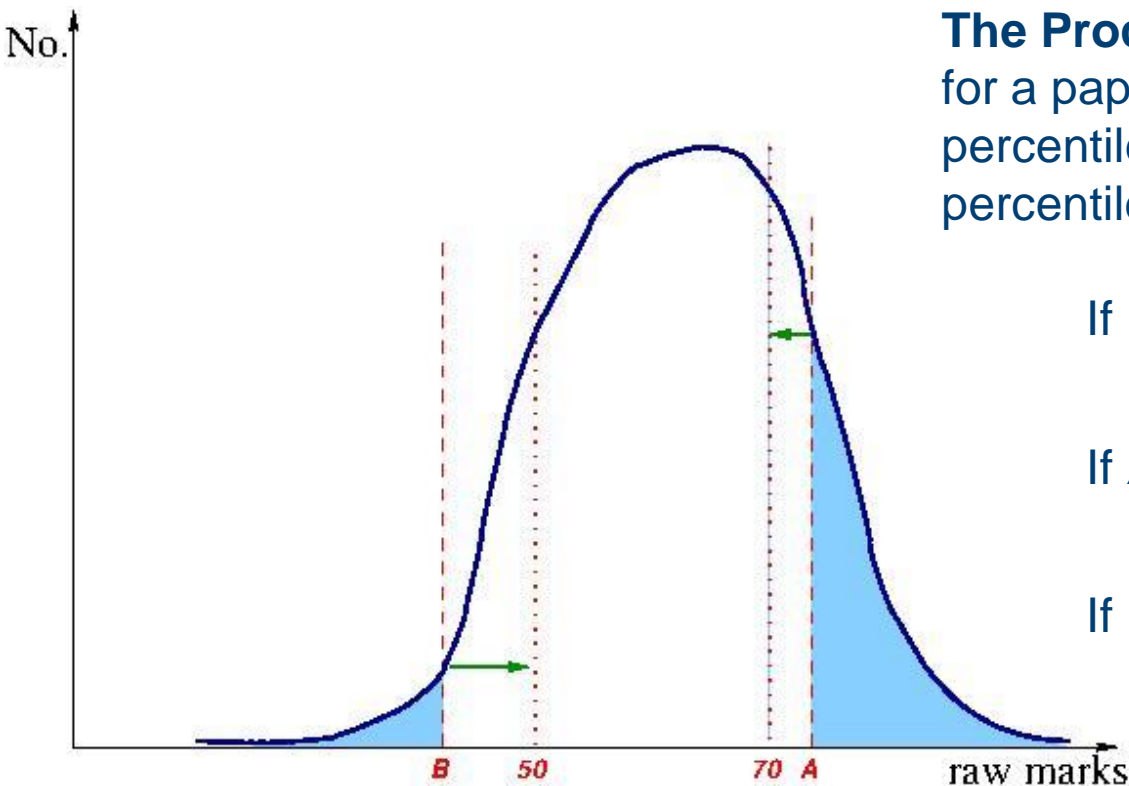
We **decree** that 25% of people **must** get 70 marks or above, and 90% of people **must** get 50 marks or above

# After the exam - Norm referencing



**The Procedure:** From the full set of marks for a paper determine the mark at the 25<sup>th</sup> percentile, *A*, and the mark at the 90<sup>th</sup> percentile, *B*.

# After the exam - Norm referencing



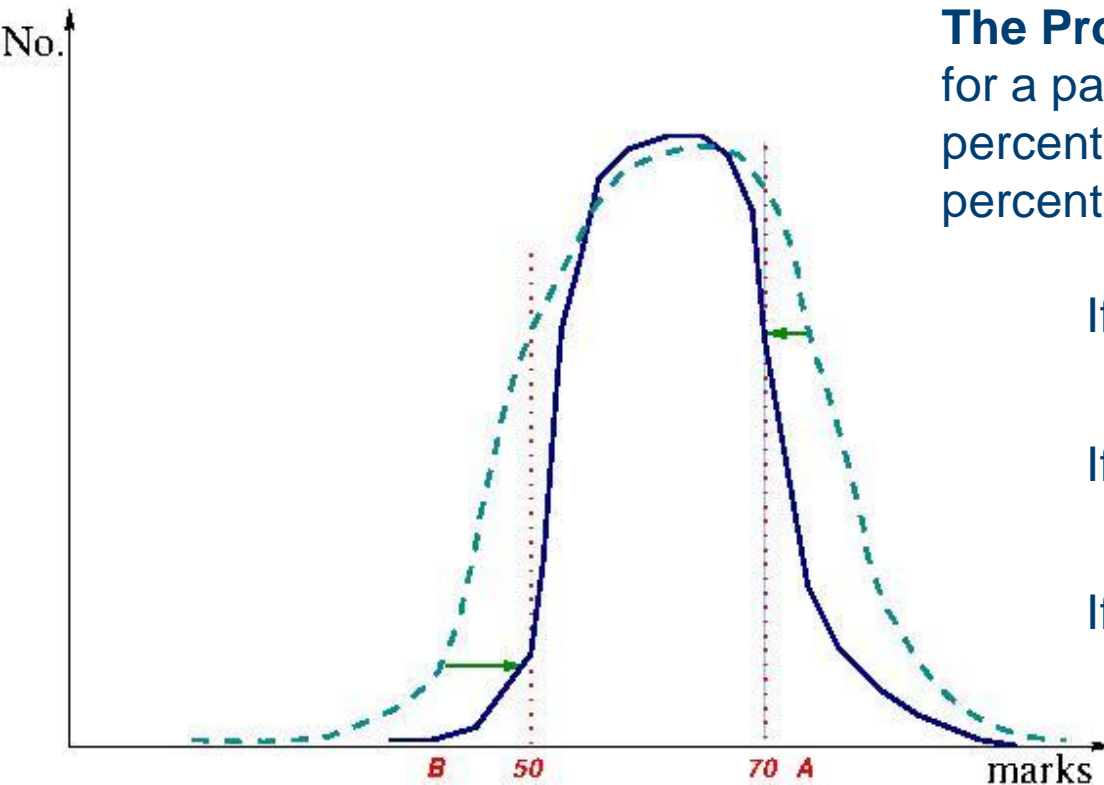
**The Procedure:** From the full set of marks for a paper determine the mark at the 25<sup>th</sup> percentile,  $A$ , and the mark at the 90<sup>th</sup> percentile,  $B$ .

$$\text{If } x \geq A: \quad x := 70 + \frac{30(x - A)}{(100 - A)}$$

$$\text{If } A > x \geq B: \quad x := 50 + \frac{20(x - B)}{(A - B)}$$

$$\text{If } B > x \geq 0: \quad x := \frac{50x}{B}$$

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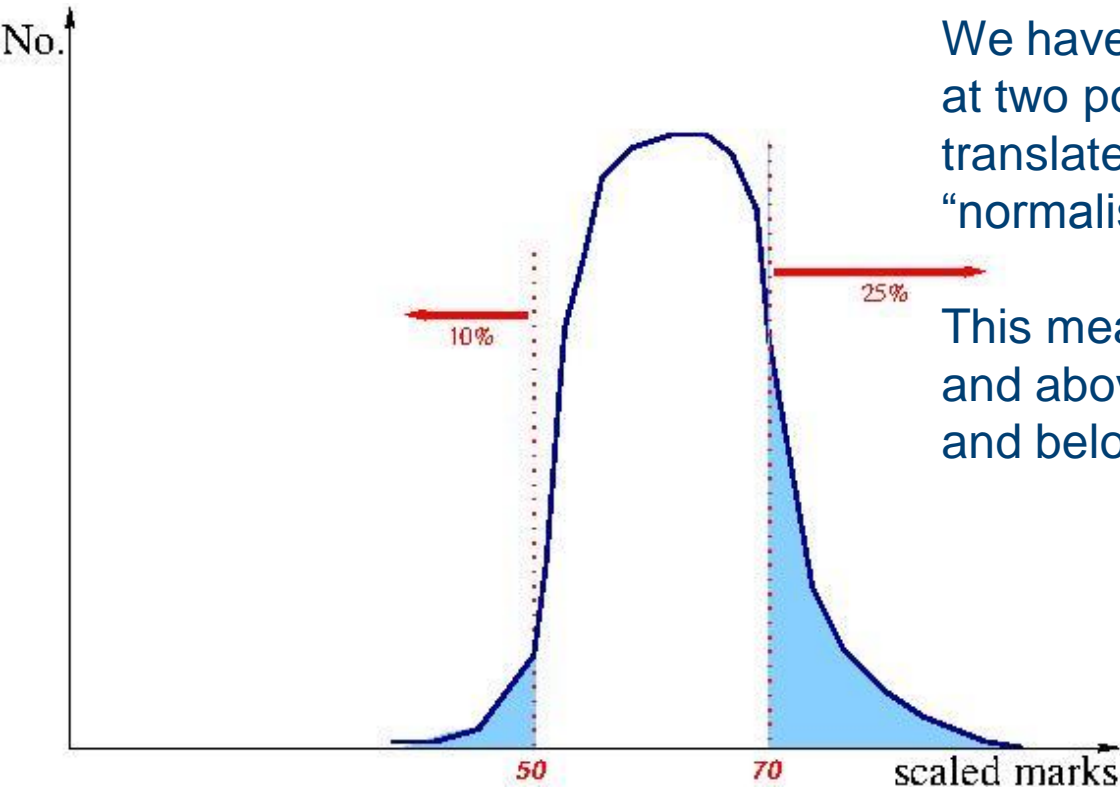
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$$\text{If } B > x \geq 0: \quad x := \frac{50x}{B}$$

e.g. if  $A = 75$ ,  $B = 37$ : a raw mark of 80 will become  $70 + 30(80 - 75)/(100 - 75) = 76.0$ ,  
a raw mark of 50 will become  $50 + 20(50 - 37)/(75 - 37) = 56.8$ ,  
a raw mark of 30 will become  $50 \cdot 30/37 = 40.5$

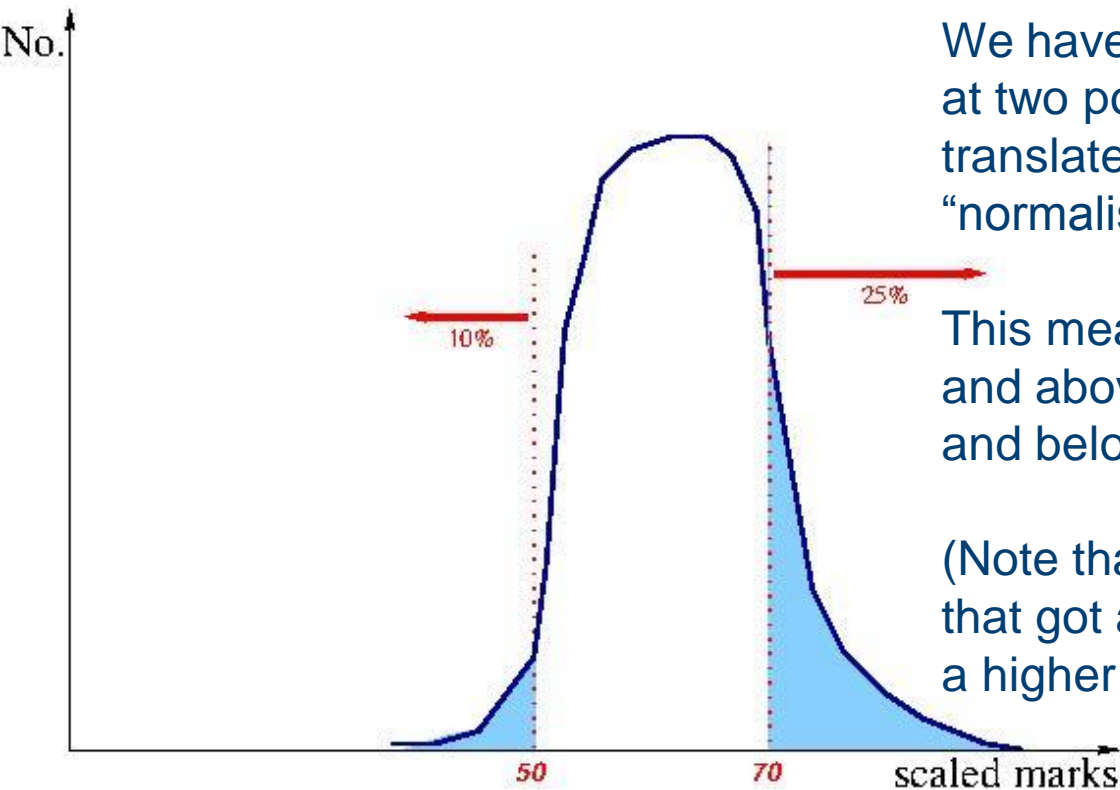
# After the exam - Norm referencing



We have effectively taken hold of our curve at two points and *skewed* (and possibly translated) it to conform to some “normalised” shape.

This means that the top 25% get marks of 70 and above, the bottom 10% get marks of 50 and below.

# After the exam - Norm referencing



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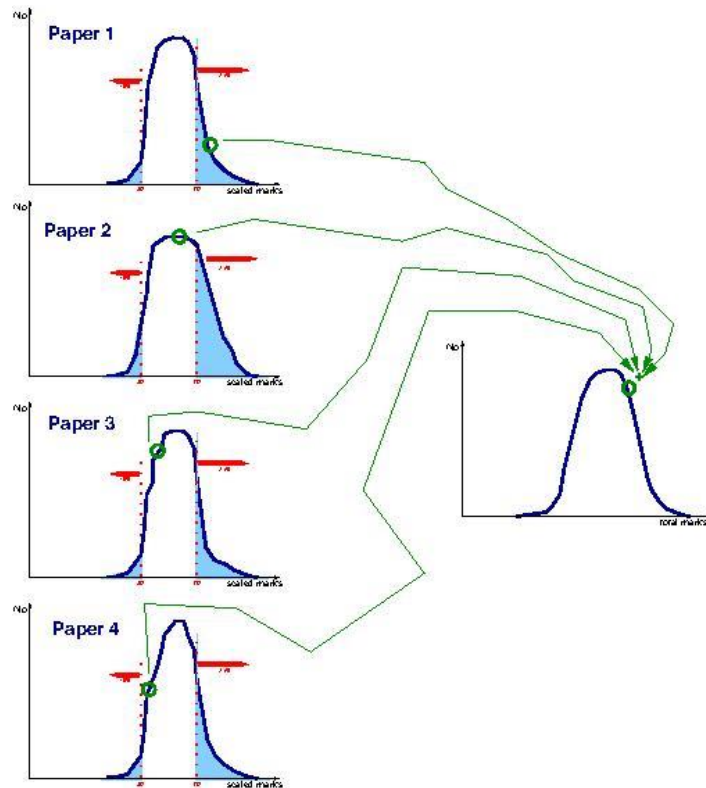
This means that the top 25% get marks of 70 and above, the bottom 10% get marks of 50 and below.

(Note that ordering is preserved, anybody that got a higher raw mark than you still has a higher scaled mark, and likewise for lower)

If this is done on all of your papers **then** we can fairly add together the marks.



# After the exam – add up the marks



...like so.

(Note that NatScis don't do this...)

# After the exam – What do the NatScis do? NST ONLY!

The NatSci Examiners also norm-reference all marks (including ours). This is because people are used to the idea that eg  $\geq 70$  is a 1<sup>st</sup>.

However they don't then add them up.

They use the mark per paper to produce a **percentage rank** (ie the top person gets 100, the bottom gets 1).

They then have 4 ranks, 1 per paper, which they add up, and use that rank total to derive a class.

(This is new from 2017)

We have a total mark, now we need to draw class boundaries

We (CST) follow the rules set out in the Marking and Classing document:

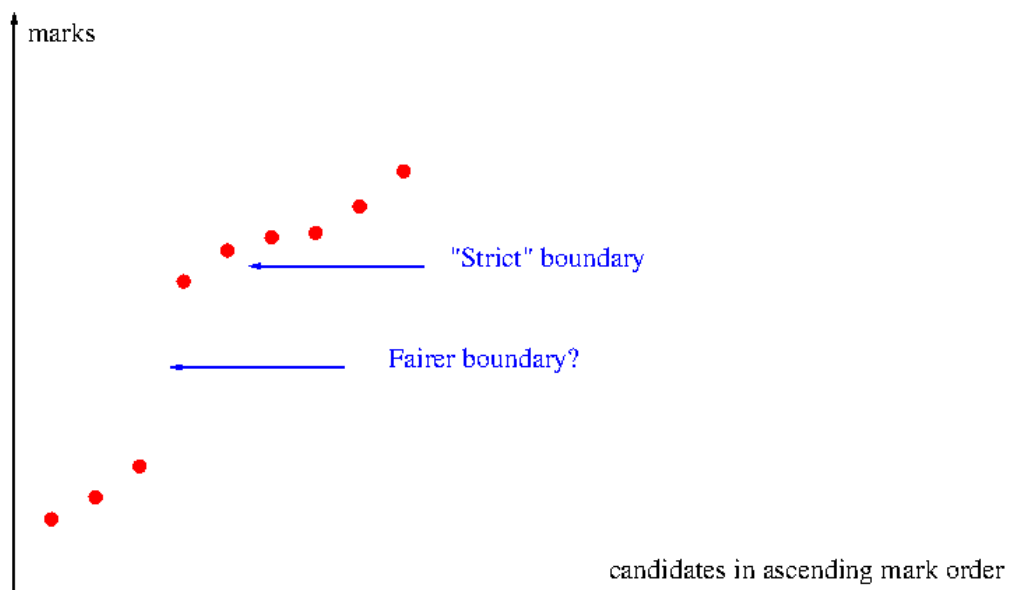
[www.cl.cam.ac.uk/teaching/exams/classing.pdf](http://www.cl.cam.ac.uk/teaching/exams/classing.pdf)

which states that examiners will partition the order-of-merit table thus:

- First 25%
- Upper Second 55%
- Lower Second 12.5%
- Third and Unclassed 7.5% (unclassified = mark below 40%)

# After the exam – Classing II

Examiners will actually use graphs like this, scatterplots, to determine the class boundaries



Computer Science results will be published on Tuesday July 3rd, in the afternoon.

They will be published on CamSIS.

Initial results will just be the class and paper marks, Directors of Studies will be given more information a day or two later.

(NatScis - different arrangements apply)

# Examination Reviews, Informal Mark Check

Once you get your exam marks, if you think we've made a mistake you may make an informal request for a mark check.

This should be done through your Director of Studies, who will have to approve it.

For example, if you are sure you should have gained 20 marks on question X, but were awarded 2, then you can ask your DoS to check.

We have done this many times over the years and have never found a recording or addition mistake, these things are double or even triple checked.

NatScis have a similar procedure.

# Examination Reviews, Formal Appeals

There is a formal procedure for appeals:

- If you are unhappy about something concerning the conduct of the exam you need to fill in the **Representations to Examiners Form** within 5 days.
- After the classlist is published if you believe a mistake has been made you need to fill in the **Examination Review Form** within 28 days of publication.

Your Tutor (or CUSU) can point you at the forms and advise you. Any form received will be handled in accordance with the University **Examination Review Procedure**.

# After the appeals – Uh oh!

It must be stressed that **very very** few people fail!

Fewer than 1% in Computer Science

The University will not say “You have failed” – it will simply not publish your name in the classlist. However, you may be granted an allowance to remain.

**What happens next is up to your college**

All will have some kind of internal appeals procedure but unless you are granted an allowance the rules are straightforward and as you would expect.

**The regulations do not allow re-sits**



# Computer Science with Mathematics **ONLY**

This slide is **ONLY** relevant to people reading Computer Science with Mathematics. If you are not such a person ignore it.

Alphas – we don't use them

You can safely ignore anything your Maths supervisors tell you about Alphas

Paper x	Paper y
15	10
5	10
<b>20</b>	<b>20</b>

For the Mathematicians Paper x is better than Paper y. For us they are exactly the same

# Computer Science Briefing Lecture

Copies of the slides are available as a PDF at my  
Computer Lab homepage:

**<http://www.cl.cam.ac.uk/users/ckh11>**