An Invitation to Computer Science
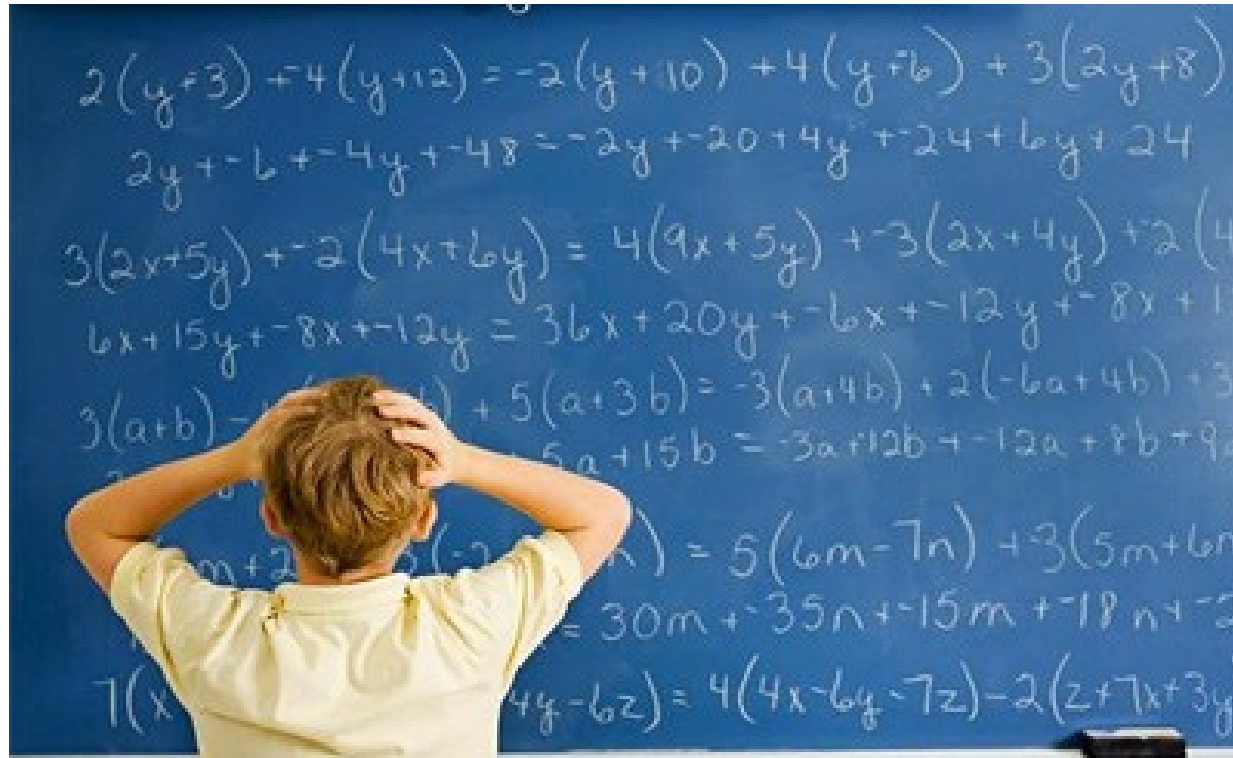
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February 2016

Puzzle 0

□ What is half of 2 + 2?

Puzzle 1

- A man has to take a wolf, a goat, and some cabbage across a river. His rowboat has enough room for the man plus either the wolf or the goat or the cabbage. If he takes the cabbage with him, the wolf will eat the goat. If he takes the wolf, the goat will eat the cabbage. Only when the man is present are the goat and the cabbage safe from their enemies. All the same, the man carries wolf, goat, and cabbage across the river. How?

MOURRI
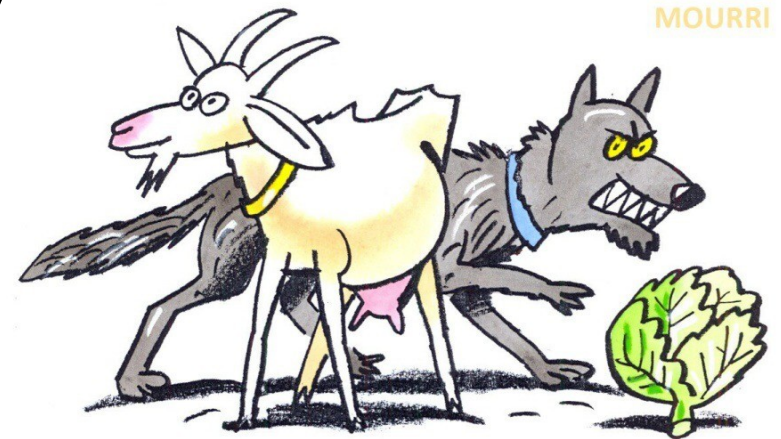
Puzzle 2

□ You have just moved into Tugwell and discovered that there are 3 light switches on the first floor that control 3 halogen floor lamps on the 10th floor. And the lift is broken! How can you determine which switch controls which light by making only one trip to the 10th floor?
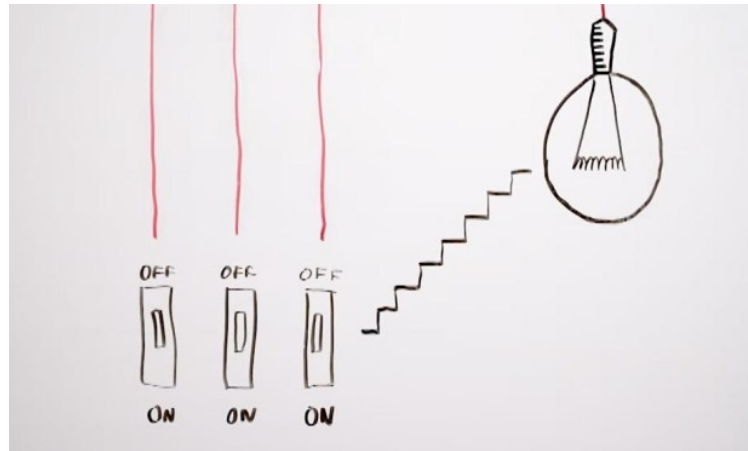
Puzzle 3

- 3 skollies are caught stealing a set of 5 almost identical soccer jerseys (3 say "sundowners" on the back and 2 say "chiefs"). They are given one last chance to avoid punishment. They are made to stand in a queue and, in the dark, each is given a jacket to wear. The other 2 jackets are hidden away. When the lights are turned on, they are told that whoever guesses which jacket they are wearing can go. The third skollie can see the first and second jackets, the second skollie can see the first jacket and the first skollie can see nothing. After a few minutes of silence, the first skollie correctly shouts out what is written on his jacket. What is it? How?

I did not come here for games …

Now what is this Computer Science thing anyway???

5 Branches of Computing

- Computer Science
  - Foundations and principles (software)
- Information Systems
  - Business processes & information
- Computer Engineering
  - Hardware and communications
- Software Engineering
  - Software development processes
- Information Technology
  - Application of computing

*Reference: ACM Computing Curricula: Overview*

Computing at UCT

- Department of Computer Science (Science Faculty)
  - Offers BSc degrees in Computer Science
- Department of Information Systems (Commerce Faculty)
  - Offers BCom degrees and BBusSci degrees in Information Systems
- Department of Electrical Engineering (Engineering Faculty)
  - Offers BSc (Eng) degrees in Electronic Engineering or Computer Engineering

Why Computing is Important 1/5

- Earth Simulator Centre in Japan provides advance notice of natural disasters to preserve human life!

Reference: http://www.es.jamstec.go.jp/esc/eng/
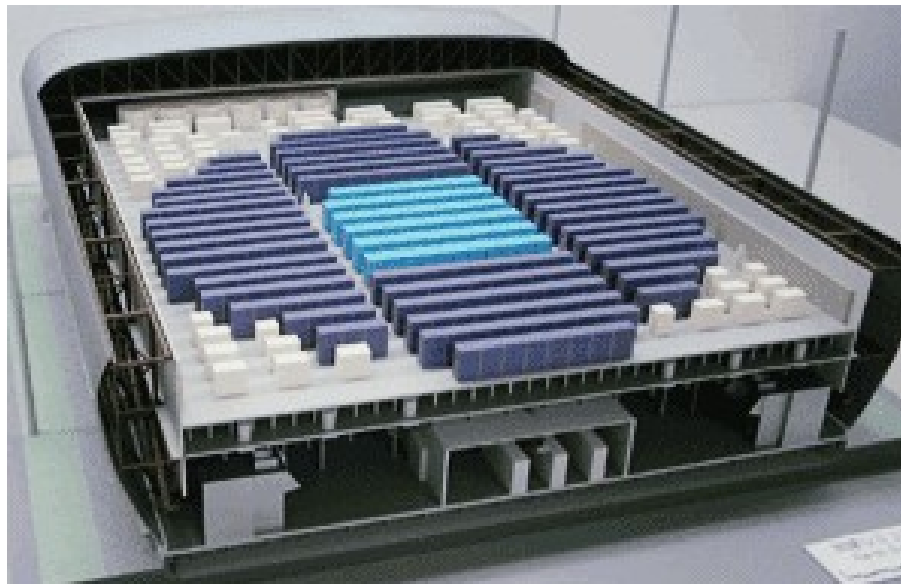
Why Computing is Important 2/5

☐ Computer Aided Tomography (CAT scans) are computer-reconstructed views of the internal organs that help in diagnosing patients.

Reference: Wikipedia

department of **Computer Science**

Why Computing is Important 3/5

□ The world's information is available at our fingertips!

- Games, Movies, WhatsApp, Facebook ...

Reference:
World of Warcraft,
The Burning Crusade,
Blizzard Entertinment

Why Computing is Important 5/5

- Billions are spent online every year in South Africa just buying airline tickets!

Reference: Goldstuck Report, January 2006

department of Computer Science

What is Computer Science?

- Computer Science (CS) is the study of:
  - Computer software
  - Algorithms, abstractions and efficiency
  - Theoretical foundation for computation

- What you learn in Computer Science:
  - Principles of computation
  - How to make machines perform complex tasks
  - How to program a computer
  - What current technology exists and how to use it
  - Problem solving

EMIT —
PART OF MASTER PROGRAM

THSUB1
~~THSUB2~~
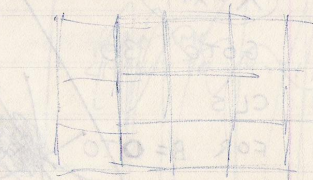
A1 - START
E5 - KING & CROWN
F5 - DOOR

A4 - ROPE   C 1
B7 - KEY   2
D.1 - ASHES   3
(F1 - GRINDER)
F7 - SCROLL   4
G4 - DAGGER   5
SWORD   6
MATCHES   7

-TERMITES = - MATCHES
-DRAGON = F - SWORD
(SWORD HAS TO BE SHARED) - DAGGER

GRINDING WHEEL
COMPASS

ROPE
SWORD
MATCHES
DAGGER
BAG OF POWDER
KEY
SCROLL

```
500   CLS
510   GOTO 510    ?:?
515   ?:?
520   IF N=1  ?:?" PRESS N TO GO NORTH "
530   IF E=1  ?:?" PRESS E TO GO EAST"
540   IF S=1  ?:?" PRESS S TO GO SOUTH"
550   IF W=1  ?:?" PRESS W TO GO WEST"
560   IF      ?:?" PRESS F TO PICK UP AN OBJECT"  FIND OUT WHAT OBJECT IS HERE
565        ?:?" PRESS L TO LEAVE AN OBJECT"
570   A$=INKEY$ :IF A$="" GOTO 570
580   IF A$="F" GOSUB 750 GOSUB 800
590   IF A$="L" GOSUB     GOSUB 800
600   IF A$="N" THEN  B=1
610    "    "  "E"  "   B=2
620    "    "  "S"  "   B=3
630    "    "  "W"  "   B=4
635   N=0: E=0: S=0: W=0
640   CLS: RETURN
750   CLS:  IF C=1  ?" YOU ARE HOLDING THE FOLLOWING:" :?
760   IF C=1  ?" ROPE "
770    "   "2  ?" KEY "
780    "   "3  ?" BAG OF ASHES "
790    "   "4  ?" SCROLL "
800    "   "5  ?" DAGGER "
810    "   "6  ?" SWORD "
820    "   7  ?" MATCHES "
```

SUBROUTINES
TREASURE

The Computer Science degree

- Focuses on:
  - Programming
  - Problem solving
  - Abstractions
  - Logic
  - Practical skills and technology
  - Deep understanding of technology

Computer Science @UCT topics

- CS1
  - Problem solving and programming in Python
  - Object-oriented design in Java
- CS2
  - Data structures, databases, HCI, parallel computing, computer architecture, software engineering, (game development)
- CS3
  - Operating systems, networking, functional programming, compilers, algorithms, advanced software engineering, (C++, machine learning, game development)
- CS Honours: a whole lot of cool stuff ...

Why study Computer Science?

- …as a Major (everyone should do CSC1015!)

- Most exciting discipline
- Phenomenal growth, "made countries"
- Can make lots of money (Apple?)
- Can get famous (Gates?)
- Can study further or even teach
- Complementary to almost any other discipline
- One major for fun; one for a career

Why Study CS @ UCT

- Degree accredited by British Computer Society (international curriculum)

- CS department ranked highest in country

- Innovative teaching (Games course, Research course, etc.)

- Diverse staff interests

- Enthusiastic staff and students!

25 MOST DESIRABLE JOBS IN AMERICA

Glassdoor's "Best Jobs for 2015" report identifies 25 specific jobs with the highest overall Glassdoor "Job Score," based on a 5-point scale (5.0=very high, 1.0=very low).

The Glassdoor Job Score is determined by weighting three factors equally: earning potential (average annual base salary); career opportunities rating; and the number of open job listings. Results represent job titles that rate highly among all three categories.

RANK	JOB TITLE	JOB SCORE	AVERAGE BASE SALARY	CAREER OPPORTUNITIES RATING	NUMBER OF JOB OPENINGS
1.	Physician Assistant	4.8	$111,376	3.5	45,484
2.	Software Engineer	4.6	$98,074	3.3	104,828
3.	Business Development Manager	4.6	$94,907	3.6	11,616
4.	Human Resources Manager	4.6	$96,443	3.6	8,073
5.	Finance Manager	4.6	$122,865	3.4	9,728
6.	Marketing Manager	4.6	$100,130	3.4	14,647
7.	Database Administrator	4.5	$97,835	3.4	9,790
8.	Product Manager	4.5	$113,363	3.3	10,294
9.	Data Scientist	4.4	$104,476	3.8	3,449
10.	Sales Manager	4.4	$76,556	3.3	26,193
11.	Solutions Architect	4.4	$121,657	3.4	3,982
12.	Mechanical Engineer	4.4	$73,015	3.3	16,065
13.	QA Engineer	4.3	$77,499	3.2	26,383
14.	Business Analyst	4.3	$74,638	3.2	21,337
15.	Electrical Engineer	4.3	$76,803	3.3	10,435
16.	Network Engineer	4.3	$87,518	3.2	14,092
17.	Civil Engineer	4.3	$73,383	3.5	6,120
18.	Audit Manager	4.3	$69,271	3.9	4,585
19.	Physical Therapist	4.3	$64,806	3.2	27,579
20.	IT Project Manager	4.3	$103,710	3.2	5,700
21.	Client Services Manager	4.2	$103,736	3.7	2,377
22.	Supply Chain Manager	4.2	$83,795	3.4	3,754
23.	Mobile Developer	4.2	$79,810	3.3	4,651
24.	Nurse Practitioner	4.2	$95,171	3.1	15,341
25.	Sales Engineer	4.2	$91,318	3.2	6,007

For a job title to be considered for this list, it must receive at least 75 salary reports and at least 75 career opportunity ratings shared by U.S.-based employees over the past year on the Glassdoor website. The number of job openings per job title represents the total number posted on Glassdoor over the past three months.

Source: Glassdoor

BUSINESS INSIDER

… but will I get a job?

UNIVERSITY OF CAPE TOWN

department of Computer Science

What does a CS graduate do?

- ☐ Not just sitting in a dark room by a terminal

- ☐ Learn by doing

- ☐ Variety

- ☐ Helping people

- ☐ Entrepreneurial

- ☐ No 'one' career

What do I need to get in?

- High school Mathematics!
  - 70% in NSC

- Thats all!

- Everything else we will teach you.
- No Matric IT needed!
  - Seriously, we can teach this stuff better :)

So what majors do I sign up for?

- CS + Business Computing

- CS + Computer Engineering

- CS + Computer Games

- CS + other
  - Math, Chemistry, Psychology, etc.

Interested?

- ask questions or find me later

- hussein@cs.uct.ac.za

- OR Come at 1:00pm on Thursday to RW James LT4A for registration with a CS major

- Questions? Questions? Questions?