Computer Science 1000: Part #1

Introduction

WHAT IS COMPUTER SCIENCE?

WHAT IS AN ALGORITHM?

THE STRUCTURE OF THIS COURSE

What is Computer Science?

- Is Computer Science ...
    - ... the study of computers?
    - ... the study of how to write computer programs?
    - ... the study of the uses and applications of computers and software?
    - ... all of the above?
- It's actually all of the above, and much more.

What is Computer Science? (Cont'd)

According to Gibbs and Tucker (1986), the fundamental task of Computer Science is the design and development of algorithms for solving important problems. This includes:

- Studying the behaviour of algorithms to determine if they are correct and efficient;
- Designing and building computer systems hardware that is able to execute algorithms;
- Designing programming languages and translating algorithms into these languages so that they can be executed by the hardware; and
- Identifying important problems and designing correct and efficient algorithms to solve these problems.

What is an Algorithm?

- An **algorithm** is . . .
    - . . . a well-ordered sequence . . .
    - . . . of unambiguous and effectively computable operations . . .
    - . . . that always produces a result . . .
    - . . . and halts in a finite amount of time.

- Let's develop an algorithm for shampooing your hair.

What is an Algorithm? (Cont'd)

Is this an algorithm for shampooing your hair?

Step	Operation
1	Wet your hair
2	Lather your hair
3	Rinse your hair
4	Repeat

What is an Algorithm? (Cont'd)

Is this an algorithm for shampooing your hair?

Step	Operation
1	Wet your hair
2	Repeat steps 3 through 4
3	Lather your hair
4	Rinse your hair

What is an Algorithm? (Cont'd)

Is this an algorithm for shampooing your hair?

Step   Operation

1   Wet your hair
2   Set the value of WashCount to 0
3   Repeat steps 4 through 6 until the value of
     WashCount equals 2
4   Lather your hair
5   Rinse your hair
6   Add 1 to the value of WashCount
7   Stop, you have finished shampooing your hair

What is an Algorithm? (Cont'd)

Is this an algorithm for shampooing your hair?

Step   Operation

1   Wet your hair
2   Lather your hair
3   Rinse your hair
4   Lather your hair
5   Rinse your hair
6   Stop, you have finished shampooing your hair

What is an Algorithm?
Why Bother?

IF WE CAN SPECIFY AN ALGORITHM
TO SOLVE A PROBLEM,
WE CAN AUTOMATE ITS SOLUTION!!!

The Structure of this Course

- **Algorithms and Programming [9 lectures]**
- **Inside the Dream Machine [9 lectures]**
  (Number Systems, Digital Circuits, Computer
  Organization, System Software)
- **Techniques and Applications [14 lectures]**
  (e.g., Databases, Networks, Security, Theoretical
  Computer Science, Artificial Intelligence)

Welcome to Computer Science (Version 1.0)

"ARE YOU READY???"

Welcome to Computer Science (Version 2.0)

"ARE YOU READY???"