

## Fun and Creative Problem Solving in Mathematics and Computer Science

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*Experience the fun of problem solving*

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## What I do and like to do...

NUS USP  
visits NYGH  
on 02-02-10

**Research:**  
Design and analysis of algorithms  
[ 算法设计与分析 ]  
Transportation Logistics  
Computational Biology  
[ 生物信息学 ]

**Teaching:**  
Algorithms Design and Analysis  
Discrete Mathematics  
Graph Theory and Algorithms  
Problem Solving in Computing  
Invitation to Computer Science (USP)

**Selected Hobbies:**  
Mentor / Develop Talents  
[ SMP, SRP, UROP, etc ]  
National Olympiad in Informatics  
[ 新加坡信息学奥林匹克竞赛 ]  
International Olympiad in Informatics  
[ 国际信息学奥林匹克竞赛 ]



[ 编程::极端应用软件:: ]  
[ 24小时不间断编程大赛 ]


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## Fun and CPS in Math-CS

### Overview of Workshop







- ❖ **The Tourist Problem**
- ◆ Hands-on Activity 1 & 2
- ❖ **Creative Problem Solving**
- ◆ Hands-on Activity 3
- ❖ **Overview of Math-CS Research Projects**

*Experience the fun of problem solving  
in Mathematics and Computer Science*



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## Student Assistants:

	Rachelle, NYGH, S3		Marie Dominique Chen, NYGH, S4
	Rachel Koh, HCI, JC1 (former NYGH)		Daniel Wong, HCI, JC2
	Wang RuoHan, NUS, SOC-UGrad		Melvin Zhang, NUS, SOC-PhD-Pgm

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## Quote from Prof. Melvin Leok

"In research, you will have to become comfortable dealing with things for which neither you, nor anyone else, know all the answers. It is tempting to spend time over preparing by reading books and papers, but at the end, there is simply no substitute for jumping right in, and learning things and finding things out for yourself along the way. Do not be afraid of making mistakes, it is an integral part of the discovery and learning process."



**Dr. Melvin Leok** (Jan 2010)  
Associate Professor of Mathematics, University of California, San Diego

ACPS class of 1987, RI class of 1991, RJC class of 1993,  
B.S., M.S., 2000, Caltech, Ph.D., 2004, Caltech.

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## Thank you!

*If you want to contact me,  
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## “Graduate” of similar Projects...

- Melvin Leok (1992)
  - ❖ GEP Research Project, S2, RI
  - ❖ “Graph Colouring” with LeongHW



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(CPS Workshop @NYGH) Page 7

## Why do Google hire mathematicians?

### Google Entices Job-Searchers with Math Puzzle



September 14, 2004 next size A A A

Mysterious banners at a Cambridge, Mass., subway stop have commuters scratching their heads. The signs, challenging passers-by to solve a complicated math problem, are actually a cryptic pitch by Google, which is looking to hire more brainy engineers. Andrea Shea reports.

The message at Harvard Square also appears on a billboard in California's Silicon Valley, but Google's name is nowhere to be found on the ads. It simply states:

#### [first 10-digit prime found in consecutive digits of e].com

In case you're wondering -- or forgot --  $e$  is the base of the natural system of logarithms, having a numerical value of about 2.71828 (though the number goes on forever).

The correct answer to the banner problem leads to a Web site that poses yet another puzzle. Eventually, the determined problem-solver lands at a Google Web page that asks the smart, or lucky, few for a resume.

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(CPS Workshop @NYGH) Page 8

## Two sides of the same coin...

### Mathematics and Computer Science

#### □ Mathematics

- ❖ Define solutions,
- ❖ Problem Formulation, Notations,
- ❖ Does solution exists, Prove properties of solution



#### □ Computer Science

- ❖ Defines input, output (solutions)
- ❖ Problem formulation,
- ❖ How to find solution, uses properties



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(CPS Workshop @NYGH) Page 10

## Faculty of Science and School of Computing

Proposal for  
**Mathematics and Computer Science**  
Double Degree

Presented by  
**Leong Hon Wai (Computer Science)**  
**Zhu ChengBo (Mathematics)**

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(Math-CS-DDP, Feb 2007) Page 11

## Mathematics and Computer Science are siblings

- Foundations of CS are in mathematics  
Alan Turing, John von Neumann
- Structures and Systems in CS  
Modelled and Analyzed with Discrete Mathematics

### Many Common R&D Frontiers:

Computational Complexity,  
Design & Analysis of Algorithms,  
Optimization Theory and Algorithms,  
Mathematical Modelling, Computer  
Simulation,  
Geometric Modelling,  
Computer Graphics and Animation

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(Math-CS-DDP, Feb 2007) Page 12