UIC Distinguished Lecture Series Presents

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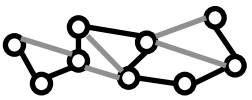
The ``P vs. NP" problem: efficient computation, Internet security, and the limits to human knowledge



4:00PM, 10/15/2014

The "P vs. NP" problem, formulated by computer theorists in the 1970s, quickly became a central outstanding problem of science and mathematics. In this talk I will attempt to describe its mathematical, scientific and philosophical content. I will discuss its status, and the implications of its resolution on science and technology (making clear that the $1M prize on solving it pales in comparison with these implications).

No special background will be assumed.

Randomness

TBD, 10/16/2014

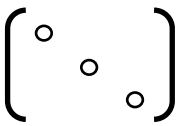
Is the universe inherently deterministic or probabilistic? Perhaps more importantly - can we tell the difference between the two?

Humanity has pondered the meaning and utility of randomness for millennia. There is a remarkable variety of ways in which we utilize perfect coin tosses to our advantage: in statistics, cryptography, game theory, algorithms, gambling... Indeed, randomness seems indispensable! Which of these applications survive if the universe had no randomness in it at all? Which of them survive if only poor quality randomness is available, e.g. that arises from "unpredictable" phenomena like the weather or the stock market?

A computational theory of randomness, developed in the past three decades, reveals (perhaps counter-intuitively) that very little is lost in such deterministic or weakly random worlds. In the talk I'll explain the main ideas and results of this theory.

The talk is aimed at a general scientific audience.

Permanent & Determinant: non-identical twins



3:00PM, 10/17/2014

The determinant is undoubtedly the most important polynomial function in mathematics. Its lesser known sibling, the permanent, plays very important roles in enumerative combinatorics, statistical and quantum physics, and the theory of computation. In this lecture I plan to survey some of the remarkable properties of the permanent, its applications and impact on fundamental computational problems, its similarities to and apparent differences from the determinant, and how these relate to the P vs. NP problem.

This lecture is intended to a general Math & CS audience.

Locations TBD