Impossible Problems

Classical problems include: squaring the circle, duplicating the cube, and trisecting angles. Solving these problems turns out to be impossible (with only a straightedge and compass), another problem that is impossible to solve (with only a straightedge and compass), but that was not discovered until 2000 years after they were formulated! We will also discuss a problem from the Middle Ages: Alhazen's billiard problem, which was first formulated by Ptolemy in 150 AD and named after Alhazen, who studied it in his work on optics. This is lore that many mathematical constants that are constructed via a limit procedure (a class that is admittedly very loosely defined) are transcendental. While it can be proven that there are infinitely many transcendental numbers, there are still fascinating open questions about whether a given complex number is transcendental. We will survey some initial developments around the number $\pi$ and prove that it is transcendental. If time permits, we will present some open problems. The talk will be accessible to a wide audience.

What is enumerative combinatorics?

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