Radical Pi presents:

Zeta Functions!

by Professor James Cogdell

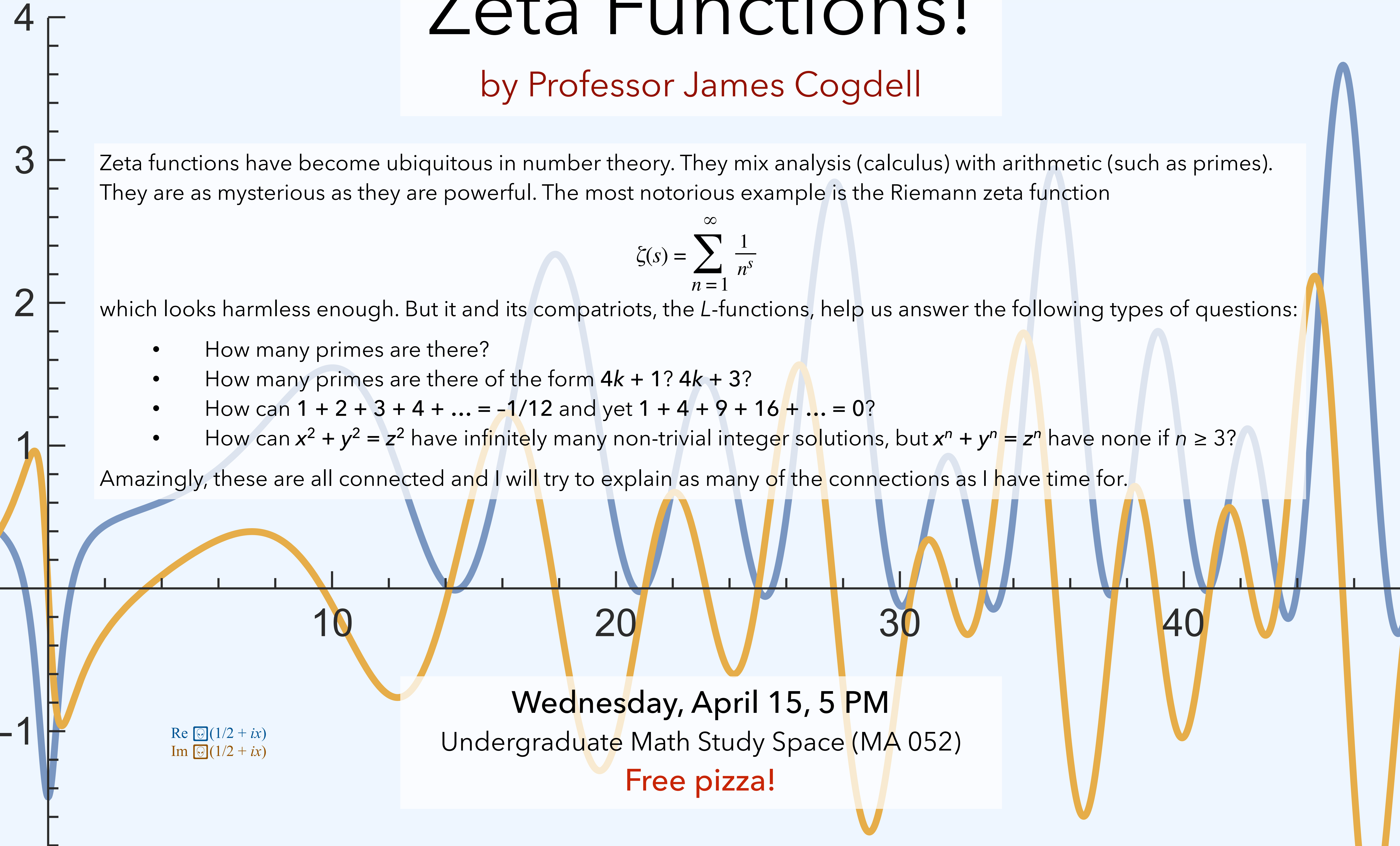
Zeta functions have become ubiquitous in number theory. They mix analysis (calculus) with arithmetic (such as primes). They are as mysterious as they are powerful. The most notorious example is the Riemann zeta function

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s}$$

which looks harmless enough. But it and its compatriots, the *L*-functions, help us answer the following types of questions:

- How many primes are there?
- How many primes are there of the form $4k + 1$? $4k + 3$?
- How can $1 + 2 + 3 + 4 + \ldots = -1/12$ and yet $1 + 4 + 9 + 16 + \ldots = 0$?
- How can $x^2 + y^2 = z^2$ have infinitely many non-trivial integer solutions, but $x^n + y^n = z^n$ have none if $n \geq 3$?

Amazingly, these are all connected and I will try to explain as many of the connections as I have time for.



Wednesday, April 15, 5 PM

Undergraduate Math Study Space (MA 052)

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