

Undergraduate Mathematics Colloquium

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“Primes within arithmetic progressions”

Friday September 15

Talk at 4:00 in Herman Brown 227

Tea & cookies at 3:30 in Herman Brown 438

Pizza after the talk

ABSTRACT: Dirichlet's Theorem on arithmetic progressions says that sequences of numbers like 2, 5, 8, 11, 14, 17, 20, etc. contain infinitely many prime numbers (in this case 2, 5, 11, 17, etc.). More precisely, it says that if an arithmetic progression has a first term and a common difference that share no prime factors, then within the progression there are infinitely many prime numbers.

I will prove Dirichlet's Theorem for the sequence 1, 5, 9, 13, 17, 21, etc., following the argument of Dirichlet's proof. The full proof involves a heavy mixture of complex analysis, group character theory, and tricky estimates. The particular case I will show contains all the features of the proof, but the details are simple enough to be understood by a student who has taken Math 102.

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