Title: Gauss factorials, and Gauss primes (joint work with Karl Dilcher)

Abstract:

The notion of a Gauss factorial was introduced in a 2008 paper by Karl Dilcher and the speaker. Subsequently this entirely elementary object enabled us to vastly extend a classic theorem of Gauss, his remarkable and celebrated 'binomial coefficient congruence' (1828).

Then, in a later paper, we introduced the notion of a Gauss prime (it relates to the Gauss binomial congruence), which is naturally and exclusively related to a very particular Gauss factorial congruence (let's call it cong_1), the least solutions of which are n1 = 205479813, n2 = 1849318317 and n3 = 233456083377.

The next known solution is the 155-digit N1 =

1830203294953468474759429106413

1327343388101729948250251743238

7652854771562362994415635012597

9683169277996381731347880880679

9687477000415482891357317727809

(there are larger known ones ...)

What do we know about the solutions to cong_1? We know *all* of them (in a sense to be explained). Are there solutions between n3 and N1? Possibly. Why don't we know one way or the other? How can one say that we know all solutions to cong_1, and not know if there are any between n3 and N1? These are the kinds of issues that I intend elucidating.

Should time allow I will make a brief mention of another similar (but more elusive) type of prime which we also introduced, a 'Jacobi' prime.

This talk will be at a completely elementary level, understandable even by an undergraduate who knows only the meaning of a congruence (a = b (mod n)).

REFERENCES.

1. The Gauss-Wilson theorem for quarter-invervals, Acta Mathematica Hungarica, Vol. 142 (2014), no. 1, 199–230.

2. A role for generalized Fermat numbers, Math. Comp. 86 (2017), 899-933.