Legendre’s formula

\[ \nu_p(n!) = \frac{n - s_p(n)}{p - 1} \]

is the simplest instance of the \( p \)-adic valuation for a sequence defined by a first order recurrence

\[ t_n = Q(n)t_{n-1}. \]

Here \( Q \) is a polynomial with integer coefficients and \( s_p(n) \) is the sum of the digits of \( n \) in base \( p \).

In this talk we describe the asymptotics of \( \nu_p(t_n) \) as \( n \to \infty \).

The extension to the case

\[ t_n = Q_1(n)t_{n-1} + Q_2(n)t_{n-2} \]

will be illustrated with the \( p \)-adic valuation of Stirling numbers.

Joint work with T. Amdeberhan, Dante Manna and Luis Medina.