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**Daniel Birmajer** (abirmaj6@naz.edu), **Juan B Gil** (jgil@psu.edu) and **Michael D Weiner\*** (mdw8@psu.edu). *Explicit formulas for roots of polynomials with coefficients in the ring of  $p$ -adic integers*. Preliminary report.

We prove two versions of Hensel's lemma that give explicit formulas for the roots of any polynomial with coefficients in the ring of  $p$ -adic integers. Our formulas are given in terms of partial Bell polynomials and rely on the inversion formula of Lagrange. For illustration purposes, we examine the special cases of quadratic and cubic polynomials, and discuss the roots of unity leading to a formula for the so-called Teichmüller lifts. (Received August 16, 2013)