In his work on the Pell equation, Euler discovered several interesting polynomial identities included among them that 
\[(2n^2 + 1)^2 - (n^2 + 1)(2n)^2 = 1\] for every \(n\). Motivated by Euler’s examples, one can ask whether it is possible to 
classify all such identities. In particular, for which polynomials \(d(x) \in \mathbb{Z}[x]\) do there exist non-trivial solutions to \(f(x)^2 - d(x)g(x)^2 = 1\) with \(f(x), g(x) \in \mathbb{Z}[x]\)? Yokota and Webb classified all such quadratic \(d(x)\) and asked about the 
situation with \(d(x)\) of degree at least 4. In this talk we’ll classify all monic, quartic, \(d(x)\) which give rise to non-trivial 
solutions to Pell’s equation. In particular, we’ll show that other than the previously known examples there is exactly one 
infinite family of such \(d(x)\). The resolution of this problem is connected to work by Mazur and Kubert on rational torsion 
points on elliptic curves over \(\mathbb{Q}\). (Received September 12, 2020)