1046-11-1446　　　　　**William D Taylor*** (`taylorw4@unr.nevada.edu`), 1619 N Virginia St, Apt 117, Reno, NV
89503. *Finding Square Roots of p-adic Numbers.*

In the study of p-adic numbers one finds that many of the operations one takes for granted on the real numbers do not work as well, or sometimes at all, in the field of p-adic numbers $\mathbb{Q}_p$. One such operation is that of finding the square root of a number. The real numbers are nicely organized into those which have real square roots (the nonnegative reals) and those whose square roots are imaginary numbers (the negative reals). The p-adic numbers, on the other hand, have a more counterintuitive nature. In fact, there are four cases one must consider when finding the square root of a p-adic number. In this paper we present what we call the r-quadratic extension of $\mathbb{Q}_p$, which we will prove is a field containing the square root of all p-adic numbers. At the same time, we will give a well-defined process for finding the square root of any given p-adic number to any degree of accuracy. The process we describe can be used for any number of purposes, including finding the general terms of second-order linear homogeneous recurrence relations of p-adic numbers. (Received September 15, 2008)