1067-15-126 **Sam L Scholze*** (scholzes@uwplatt.edu), 435 Gardner Hall, 1 University Plaza, Platteville, WI 53818, and **Ryan L Hotovy** (ryan.hotovy@gmail.com), 203 Avery Hall, University of Nebraska-Lincoln, Lincoln, NE 68588. *Unitary Equivalence of Vector Spaces over the Binary Field.* Preliminary report.

Vector spaces over the binary field $\mathbb{Z}_2$ share certain properties with familiar vector spaces over $\mathbb{R}$ such as the existence of bases for spaces. There are, however, many differences. For example, when equipped with the dot product, a vector space over $\mathbb{Z}_2$ becomes an indefinite inner product space where non-zero vectors may have zero length. We continue previous work on these spaces by investigating subspaces of $\mathbb{Z}_2^n$ and ask when two vector spaces are unitarily equivalent. In particular we consider embeddings of subspaces into $\mathbb{Z}_2^n$ for some n. An algorithm is given showing that every vector space over $\mathbb{Z}_2$ can be embedded in this manner. We also investigate the existence of both Parseval frames and dual frames for vector spaces over $\mathbb{Z}_2$ and their relation to the Grammian operator. Finally we show that, unlike vector spaces over $\mathbb{R}$, the existence of a dual frame pair does not necessarily imply the existence of a Parseval frame of the same length for a space. (Received July 26, 2010)