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**Daniel J Freese\*** (dfreese3@liberty.edu), 5706 Wainwright Avenue, Rockville, MD 20851.

*Calculus on a Real Associative Algebra.*

We generalize complex analysis by studying calculus on a general real associative algebra. We develop the notions learned in first and second semester calculus, extended to algebras, including limits, differentiation, and integration. Power series on an algebra allows us to study special functions on it, such as the exponential, sine, cosine, and hyperbolic sine and cosine. Using power series, we also define algebra-specific functions from the construction of a specific algebra, which generalize the standard trigonometric and hyperbolic functions. These new functions, for a special family of algebras, have many remarkable properties, including satisfying a general Pythagorean identity. (Received September 13, 2016)