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William M. Kinney* (bkinney@bethel.edu), Bethel University, 3900 Bethel Drive, P.O. Box 95, St. Paul, MN 55112, and **Jake Smith** (jss35646@bethel.edu). *An Example of Student/Faculty Summer Research in Actuarial Mathematics: Using Mathematica to do Demographic Modeling and the Surprising Relevance of Hypergeometric Functions*. Preliminary report.

In anticipation of eventually building an emphasis on actuarial mathematics into the mathematics major at Bethel University, during the summer of 2012, we started learning about actuarial mathematics by exploring basic demographic models and tweaking them. *Mathematica* was a very valuable tool for this exploration that allowed us to consider the behavior of life expectancy functions under nonstandard assumptions about the force of mortality. Models explored included one where the force of mortality was assumed to be periodic and another where the force of mortality was assumed to be the sum of a periodic term and a Makeham term. *Mathematica* provided us with very nice ways to approximate life expectancy functions, visualize the effects of changes in parameters, and simulate sampling from the resulting survival distributions. We also were surprised to find that a sinusoidal force of mortality with a single frequency was sufficient to generate a life expectancy function whose description required the use of hypergeometric functions. Demonstration of the relevant *Mathematica* code and an explanation of how hypergeometric functions arise in these models will be given. (Received September 13, 2012)