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Keshav P. Pokhrel* (kpokhrel@mercyhurst.edu) and **Chris P. Tsokos**. *Modeling Cancer Mortality Rates through Differential Equations*.

Differential equations are powerful tools for modeling data. We present cancer mortality rates as a function of time to explore explicit relation between functions and their derivatives. Nonparametric smoothing methods are used to mitigate the existing randomness in the observed data. We present a systems of differential equations revealing the dynamics of cancer mortality rates in the United States using functional data analysis techniques. This study also present the disparity of brain cancer mortality rates among the age groups together with the rate of change of mortality rates. *Principal Differential Analysis* is used to measure the noisy features of the data in a single curve and the variations of the data are also measured across the curves. (Received September 15, 2014)