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**Mark Burgin\***, UCLA, Los Angeles, CA 90095, and **Alan C. Krinik**, California State Polytechnic University, Pomona, CA 91768. *What to do with Random Variables that don't have Expectations*. Preliminary report.

It is well known that the expected value does not exist for some important distributions, such as the Cauchy distribution. To overcome this limitation, we extend the concept of expectation to the concept of hyperexpectation. Hyperexpectation is constructed as a hyperintegral of a random variable instead of the integral used for conventional expectations. This allows us to correspond hyperexpectation to all random variables in such a way that when a random variable has the expected value, its hyperexpectation coincides with this expected value. In addition, we characterize hyperexpectation by axioms, building hyperprobabilities (cf. Burgin, M. and Krinik, A. Introduction to Conditional Hyperprobabilities, Integration: Mathematical Theory and Applications, 2(3), 2011, 285-304) based on hyperexpectations and demonstrating that probabilities emerge from expectations in this approach. Properties of hyperexpectation and hyperprobabilities are obtained. It is also proved that the conventional expectation of random variables is a special case of hyperexpectation, demonstrating that the concept of hyperexpectation is a natural generalization of the concept of expectation and this generalization extends efficiency and applicability of probability theory. (Received August 15, 2012)