1086-46-34 **Mark Burgin***, Department of Mathematics, UCLA, Los Angeles, CA 90095. *Feynman Integral in the Context of Hyperintegration.* Preliminary report.

Hyperintegration essentially extends the class of integrable functions. In (Burgin, M. Hyperintegration Approach to the Feynman Integral, Integration: Mathematical Theory and Applications, v. 1, No. 1, 2008, pp. 59-104), the Feynman path integral is formalized in the context of hyperintegration. The advantage of this approach is that Feynman path hyperintegral always exists, taking, in general, values in the space of hypernumbers. When the value of the Feynman path hyperintegral is finite, it defines the corresponding Feynman path integral. Here we study properties of the Feynman path integrals and hyperintegrals. It is demonstrated that many properties of conventional integrals, such as linearity, positivity or continuity, are preserved for Feynman path integrals and hyperintegrals. These properties allow mathematicians, physicists and other researchers to operate with the Feynman path integrals and hyperintegrals in a mathematically grounded way. In particular, it provides means for Feynman path integral regularization. (Received June 05, 2012)