1064-81-13   **Stephen F Sawin*** (`ssawin@fairfield.edu`), 1073 N. Benson Road, Bannow 105, Fairfield, CT 06824, and **Dana Fine** (`dfine@umassd.edu`). *Supersymmetric Quantum Mechanics, Infinite-Dimensional Matthai-Quillen, and the Gauss-Bonnet-Chern Theorem.* Preliminary report.

An interpretation of the path integral representation of the propagator of $N = 1$ imaginary time Supersymmetric Quantum Mechanics in curved space-time is offered which is sufficiently robust that it can be proven to yield the heat kernel of the Hodge-Laplace operator and also to be approximated by the steepest descent approximation for both small time and small $\hbar$ (in real time this would correspond to the stationary phase approximation). These tools allow one to make the proof of the Gauss-Bonnet-Chern Theorem suggested by Witten and made precise by Alvarez-Gaumé and Friedan and Windey rigorous essentially as is (they work with the Index Theorem, but for simplicity we restrict attention to the special case of the GBC Theorem). (Received July 22, 2010)