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Patricia Mehron Garmirian* (patricia.garmirian@tufts.edu), 15 Bellevue Street, Medford, MA 02155. *A new, direct, and elementary proof of the Central Limit Theorem.*

We give a new, direct, and elementary proof of the general Central Limit Theorem (CLT). Two important stepping-stones are, first, a new, similarly direct and elementary proof of the CLT for Rademacher random variables defined on $[0,1]$. The second important stepping-stone is a new result for Bernstein polynomials of continuous functions. Bernstein polynomials are a fundamental object of mathematical analysis. It is well known that Bernstein polynomials of a continuous function on intervals $[0, b_n]$ when n tends to infinity return the value of the function for an appropriate rate of b_n , but uniform convergence is sacrificed. Nothing was known for the symmetric interval $[-b_n, b_n]$. We have proven that for these intervals the limit does not recover the function but rather its integral with respect to Gaussian measure. The extension to our direct proof of the of the general CLT involves a new and surprising connection between the CLT and the Haar basis on $[0, 1]$: the i.i.d. sequence of random variable is transformed to a sequence defined on $[0,1]$ and the random variables in the transformed sequence are then expanded with respect to the Haar basis. (Received September 10, 2013)