Integration and approximation of functions by Monte Carlo and quantum methods

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We study integration and approximation in the randomized and quantum setting of Information-Based Complexity. We consider integration of functions from Sobolev spaces W_p^r and their approximation in the norm of L_q. The case of W_p^r being embedded in C (embedding condition) was solved before in both settings. In the case of spaces not satisfying the embedding condition the complexity had been established for the randomized setting, while the quantum complexity was left open. We present the solution which uses tight relations between the randomized and quantum setting and a recent randomized discretization technique. The results are compared to the previous ones in both settings.