Submission Deadline: September 05, 2024, 12:15 PM

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1. Use the following Monte Carlo estimator to approximate the expected value $I = E[\exp(\sqrt{U})]$ where, $U \sim U(0,1)$:

$$I_M = \frac{1}{M}\sum_{i=1}^{M} Y_i, \text{ where } Y_i = \exp(\sqrt{U_i}) \text{ with } U_i \sim U(0,1).$$

   Take the values of M to be $10^2, 10^3, 10^4$ and 10^5. Determine the 95% confidence interval for I for all the four values of M that you have taken. What is the exact value of I? Compare the exact value of I with the estimated values of I for different values of M.
