

ASSIGNMENT 5

April 20, 2004 (before 6:00 pm)

Homework 5: Evaluating a 2-Dimensional Integral Using the Quasi-Monte Carlo Method

Evaluate the following 2-dimensional integral:

$$I = \int_0^{\pi/2} \int_0^{\pi/2} \frac{\sin x_2 \sqrt{1 - k^2 \sin^2 x_1 \sin^2 x_2}}{1 - k^2 \sin^2 x_2} dx_1 dx_2.$$

where $k = 3/5$ and the exact answer is $5\pi/8$. Just as you have done in homework 4, use the Sample-Mean Monte Carlo method for various different number of trials, N . For each N , repeat the simulation a dozen or so times and take the average of the mean to smooth out the result.

Now generate the Halton sequence for base 2 and 3. Print out about 50 of these low-discrepancy numbers (so that I can check to see if they are correct). Perform a quasi-Monte Carlo simulation to compute this integral using the Halton sequences with the same number of points as for the Sample-Mean method. Compare and comment on the results that you obtain for these two separate methods.