Homework 4

May 29, 2018

1. We want to compute the variance of standard Normal:

$$\int_{-\infty}^{\infty} x^2 \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}} dx$$

by a Monte Carlo method.

(a). If we sample from $N(0, \sigma^2)$, what is the variance of your Monte Carlo estimate?

(b). From (a), what is the optimal σ?

(c). Does the answer from (b) agree with your intuition? Can you write something in words to explain it in addition to Math above?

2. Henry has a debt of 200 million dollars to an underground bank. He has only 20 million dollars now. If he can not get 200 million dollars today, he will be killed. He goes to a casino to try his luck on the wheel. He plans to bet 1 million dollars on odd or even. The probability that he wins in each time is 18/38. Can you estimate the probability that he goes out of the casion with 200 million dollars?