

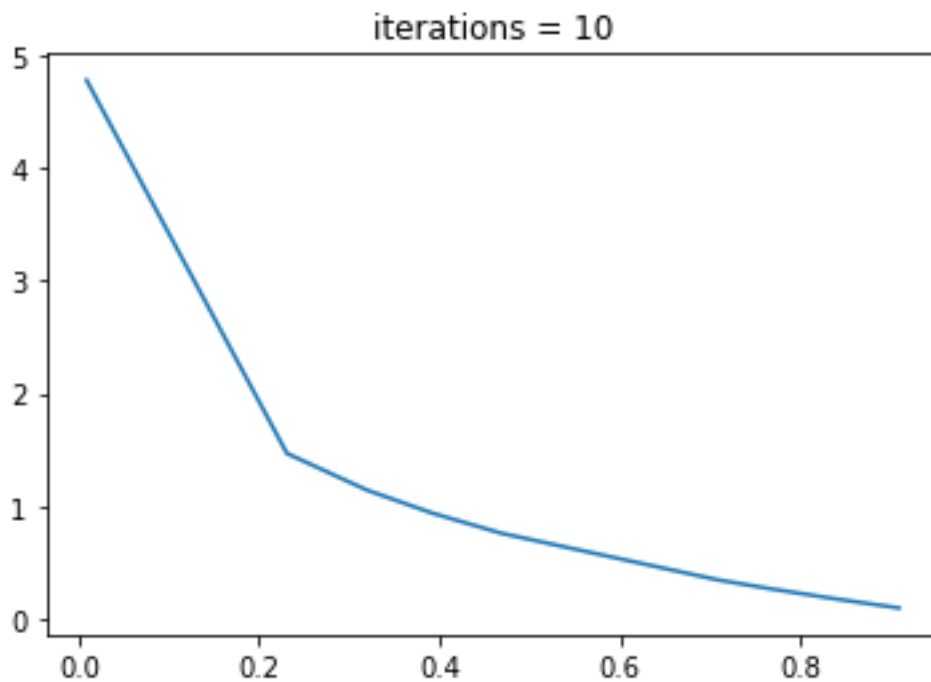
2. Write a Monte Carlo program (using a programming language of your choice) to sample the probability density function $f(x) = \exp(-x), x > 0$.

a. Estimate the mean and variance of $f(x)$ using 10, 40, and 160 histories and compare the results to the values that you obtain analytically.

10 iterations

mean = 0.515894297515

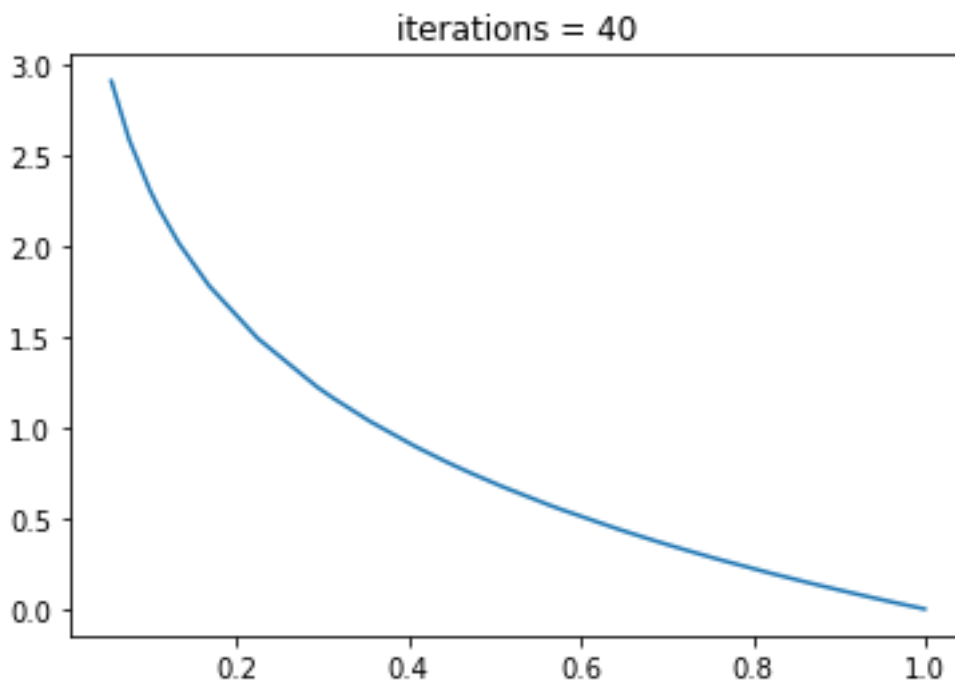
variance = 0.0838033090832



40 iterations

mean = 0.592864194218

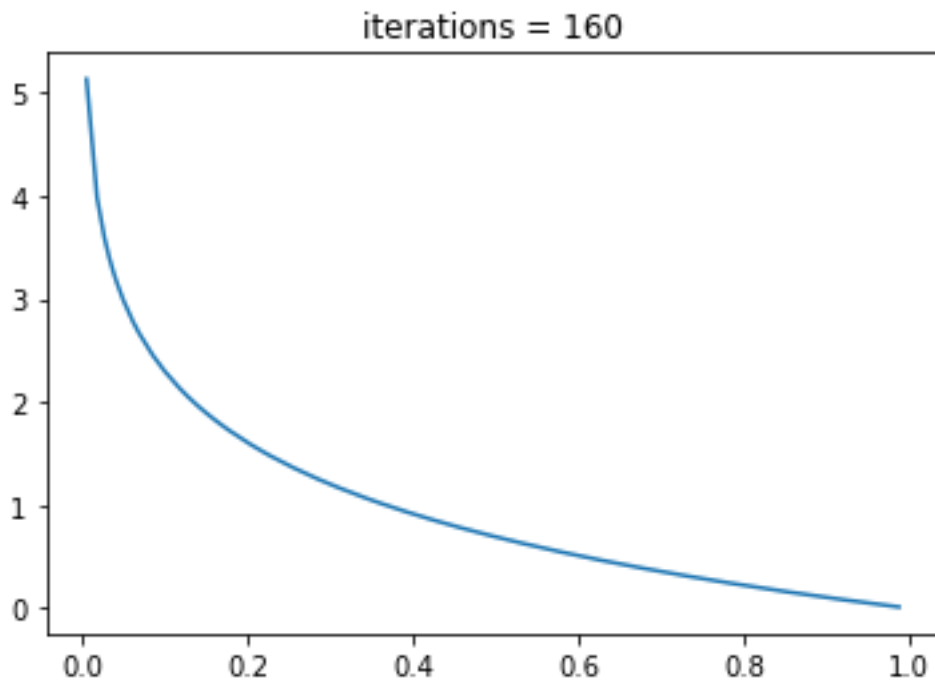
variance = 0.0874525751469



160 iterations

mean = 0.508781012246

variance = 0.08802999144



b. After running 100 or more batches of 100 histories each, make a histogram like the figure below for the distribution of the batch averages. Plot the Gaussian distribution that is predicted for the batch averages from the central limit theorem.

