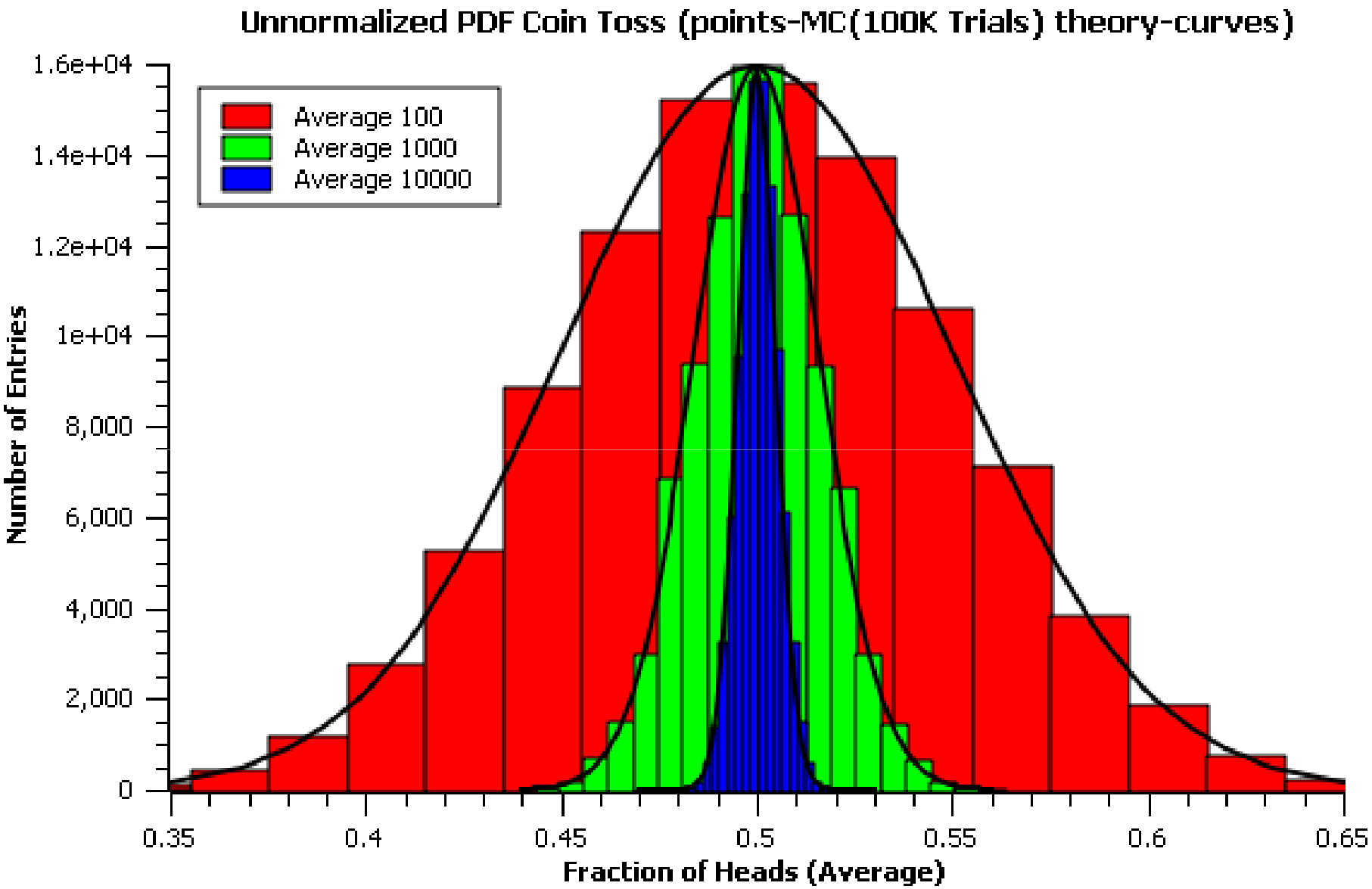
1000 sets of averages for each of 100, 1000 and 1000 coin tosses were generated. The statistical quantities for these three set for 100,000 trials is shown below. A histogram (data points) of the three samples is shown in the following slide, along with the theoretical PDF as a function of the fraction of times the coin flip is a heads.

$$\frac{\sqrt{0.5(1-0.5)}}{\sqrt{N}}$$

$N_{average}$	μ(measured)	σ(measured)	σ(theory)
100	0.500128	0.050148	0.050000
1000	0.499439	0.015805	0.015811
10000	0.499989	0.004999	0.005000


Unnormalized PDF Coin Toss (points-MC(100K Trials) theory-curves)
Average 100
Average 1000
Average 10000
Number of Entries
1.6e+04
1.4e+04
1.2e+04
1e+04
8,000
6,000
4,000
2,000
0
0.35
0.4
0.45
0.5
0.55
0.6
0.65
Fraction of Heads (Average)

"An experiment to prove this point [that the result of a large number of coin tosses will be almost equally divided between heads and tails] was performed by Kerrich while he was interned in Denmark during the last war. He tossed a coin 10,000 times and obtained altogether 5067 heads..."

From *Principles of Statistics* by M. G. Bulmer

Calculate the fraction of time one would get an answer further From 0.5 than this.

σ=0.005 so 0.0067=1.34 σ

$$2\int_{1.34}^{\infty}\frac{e^{\frac{-x^2}{2}}}{\sqrt{2\pi}}dx = 0.1802$$