

# *statistical inference final project*

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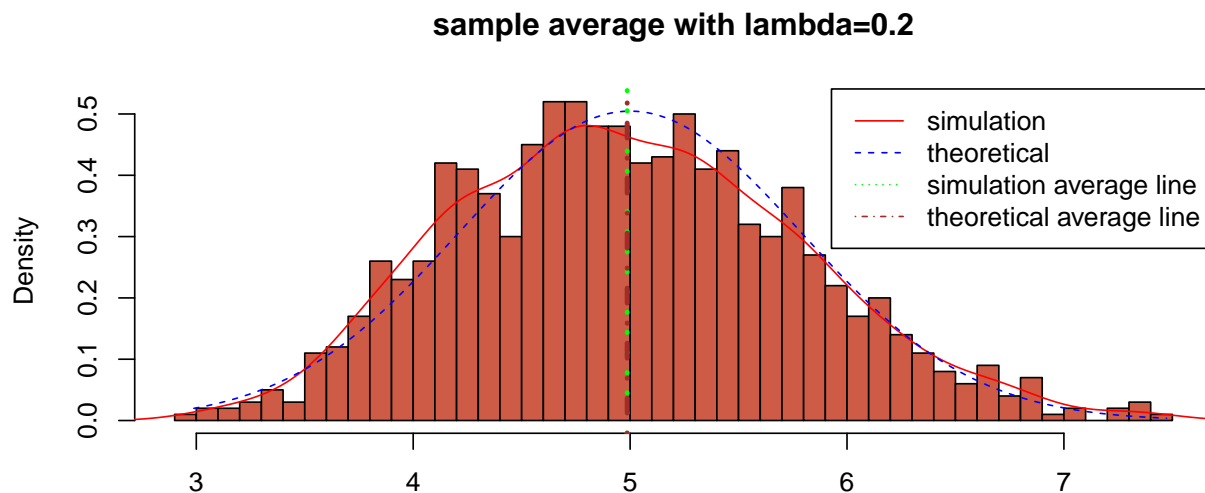
*Friday, May 22, 2015*

## *Introduction*

The basic concept behind Central Limit Theorem (CLT) is that as increase occurs in number of samples of distribution of iid samples converges to standard normal state so the mean and standard deviation characteristic converges to population mean and standard deviation. In this report theoretical concept of Exponential distribution compared with results of central limit theorem.

IN PROBABILITY THEORY AND STATISTICS<sup>1</sup>, the exponential distribution (a.k.a. negative exponential distribution) is the probability distribution that describes the time between events in a Poisson process, i.e. a process in which events occur continuously and independently at a constant average rate. It is a particular case of gamma distribution. based on theory the expected value is  $E[x] = 1/\lambda$  and standard deviation of exponential distribution is  $\sigma[x] = 1/\lambda$ .

<sup>1</sup> [http://en.wikipedia.org/wiki/Exponential\\_distribution](http://en.wikipedia.org/wiki/Exponential_distribution)



In 1000 times of simulation the constructed sample average curve is with mean of about 5.011 that in theory should be 5 and standard deviation of about 0.780 that in theory should be about 0.790.

Figure 1: Comparison between Simulation and theoretical of Exponential distribution

for evaluating the variation of sample normal distribution with the theoretical normal values Mean squared error in curve structure have been used as:

```
sum(((dty$y - yfit)^2)/length(yfit))
```

```
## [1] 0.002177917
```

$$MSE = \frac{\sum_{n=0}^{\infty} (output - target)^2}{N}$$

Figure 2: MSE equation