Simulation of exponential distribution

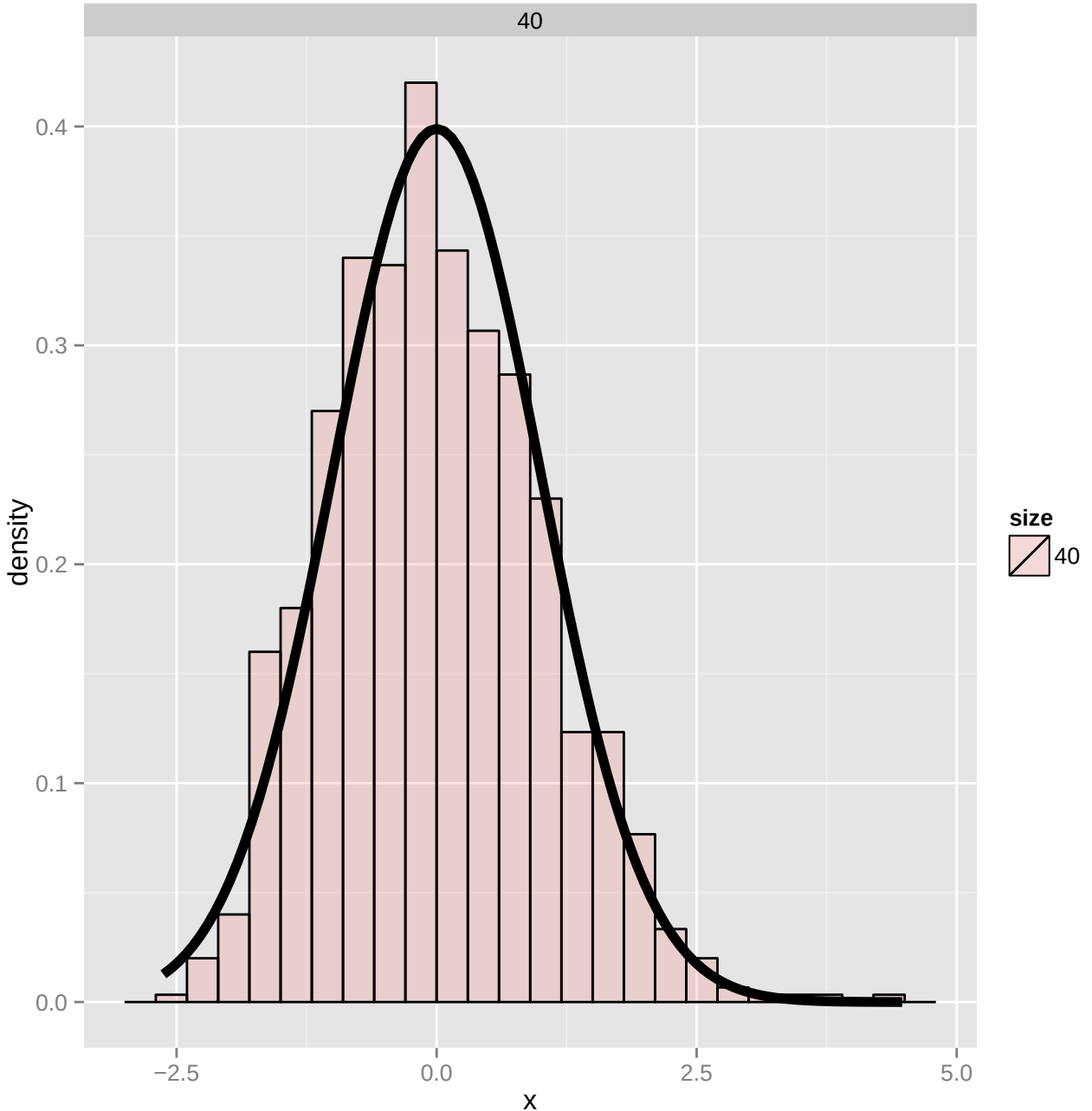
-- by Leonardo

1000 times of simulation with sample size of 40

R Code I used :

```
nosim <- 1000
lambda <- 0.2

cfunc <- function(x, n) sqrt(n) * (mean(x) - 1/lambda) / (1/lambda)
dat <- data.frame(
  x = c(
       apply(matrix(rexp(nosim * 40, lambda),
                 nosim), 1, cfunc, 40)
  ),
  size = factor(rep(c(40), rep(nosim, 1))))

g <- ggplot(dat, aes(x = x, fill = size)) + geom_histogram(alpha = .20, binwidth=.3, colour =
"black", aes(y = ..density..))

g <- g + stat_function(fun = dnorm, size = 2)

g + facet_grid(. ~ size)
```

As suggested, I only modified the code given in lecture 07, and it works pretty well ! Graph is on the next page.


40
density
0.4
0.3
0.2
0.1
0.0
−2.5
0.0
2.5
5.0
x
size
40

The critical code to compare random exponential samples with normal distribution is :

```
> cfunc <- function(x, n) sqrt(n) * (mean(x) - 1/lambda) / (1/lambda)
```

This function does something like normalization, based on CLT (Central Limit Theorem).

In theory, after apply *cfunc*, the distribution should be very alike to normal distribution whose mean is 0 and variance is 1.

1. Compare the mean

Based on the graph, I would say the distribution centered very well, the mean is very close to 0 which is exactly what it should be.

1. Compare the variance

Again, from the graph, it can be seen that the shape of distribution fit the normal distribution very well (the black line is the pdf of normal distribution) . So, the variance is also very close to theoretical value which is 1.