Statistical Inference Course Project Part1

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Overview In this report 1000 simulations have been done to perform 40 experiments on exponential distribution. The simulation resulted in almost same mean and variance as our theoretical Values.

```
lambda = .2
n = 10
rexp(n,lambda)
```

```
##  [1]  6.2144834  1.8925112  1.4919962  0.3457286 17.4284538  4.4806189
##  [7]  4.9608986  2.5428541  1.7173845  1.9940342
```

```
mean=1/lambda
sd = 1/lambda
var = sd^2

# comparison of simluataion mean and theoretical mean
matrix1 <- matrix(rexp(40000,.2),nrow=1000,ncol=40)
```

In the above code a simulation is performed to generate a 1000*40 matrix
which has 1000 simulations to generate 40 exponential distribution observations.
Theoretically both mean and variance have value 1/lambda.

```
rowmean <- apply(matrix1,1,mean)
simulationMean <- mean(rowmean)
rbind(mean, simulationMean)
```

```
##                    [,1]
## mean           5.000000
## simulationMean 4.976017
```

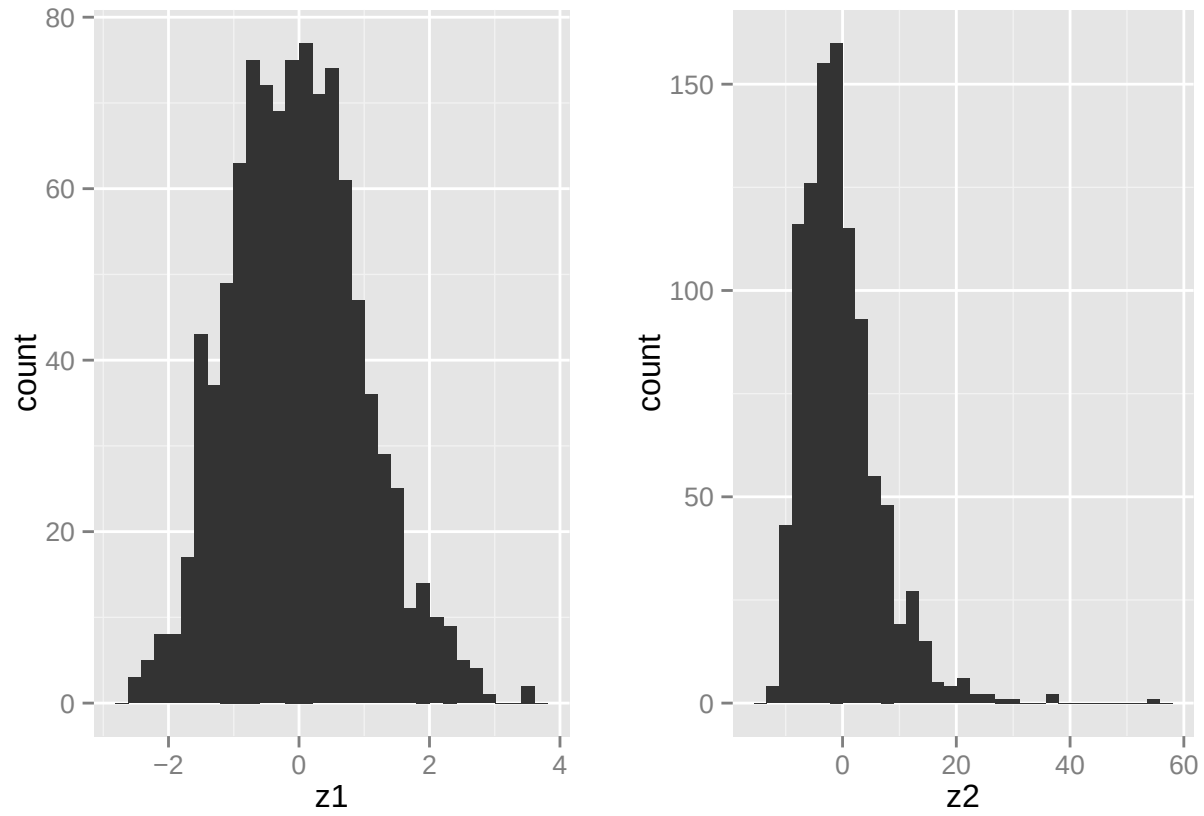
```
z1 = sqrt(40)*(rowmean-mean)/sd


rowvar <- apply(matrix1,1,var)
simulationVar <- mean(rowvar)
rbind(var, simulationVar)
```

```
##                   [,1]
## var           25.00000
## simulationVar 24.47471
```

```
z2 = (rowvar-var)*sqrt(n)/sd
library(ggplot2)
library(gridExtra)
```

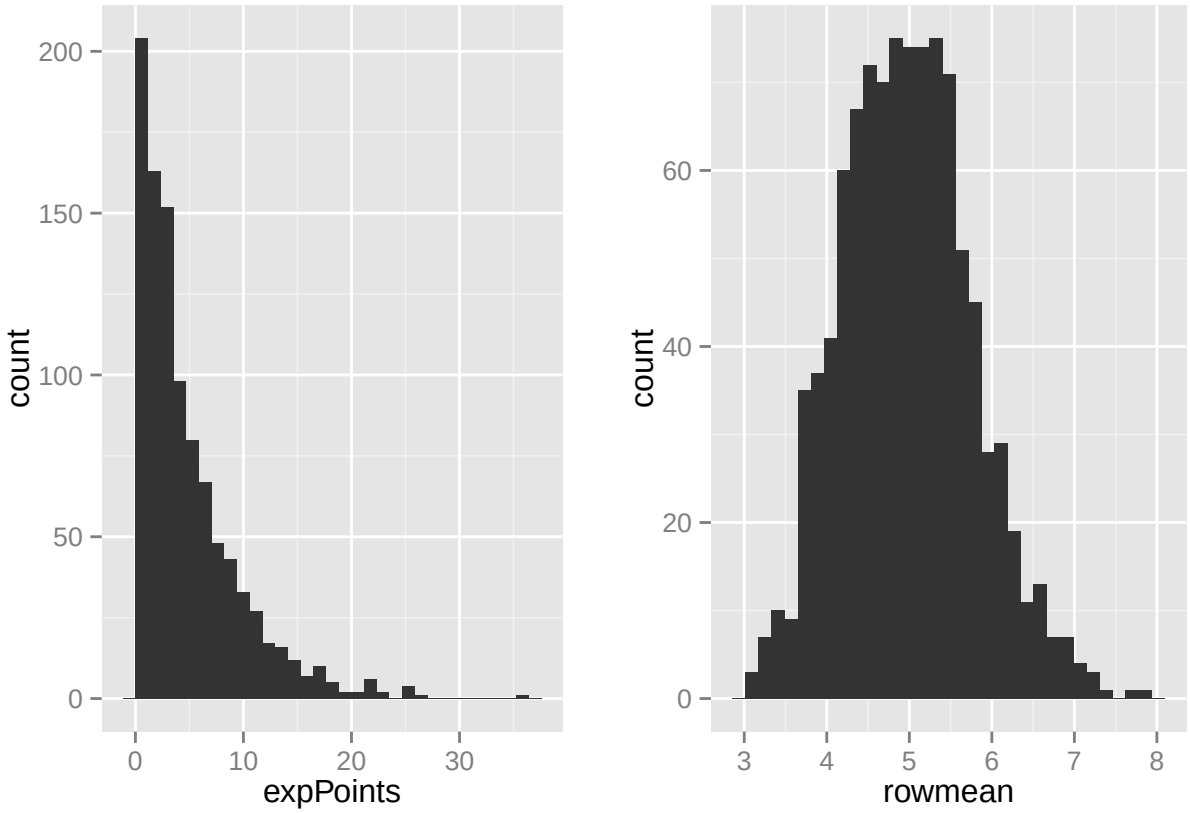
```
## Loading required package: grid
```

```
plot1 <- qplot(z1, geom="histogram")
plot2 <- qplot(z2, geom="histogram")
grid.arrange(plot1,plot2, nrow=1, ncol=2)
```



Mean and variance of each simulation has been taken which then averaged across the number of simulations. The results are almost equal to the theoretical mean and variance values. As can be seen from the result. Z score of simulated mean and vairance values have been plotted as a histogram which is almost a Normal Distribution.

```
expPoints <- rexp(1000,.2)
plot11 <- qplot(expPoints, geom="histogram")
plot21 <- qplot(rowmean, geom="histogram")
grid.arrange(plot11,plot21,nrow=1,ncol=2)
```



In the above picture its evident that exponantial points are highly skewed but once converted to z secore they are almost normally distributed around the mean value that is 4.9760169 or 5