

Лабораторная работа №4

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Задание 1

Генерация и простейшие статистики

Сгенерировать выборку из 200 элементов из нормального закона распределения(Ширяев 1980) со следующими параметрами:

$$N(\mu, \sigma^2), \mu = 0, \sigma^2 = 4$$

Вывести первые 10 и последние 20 сгенерированных значений. Вывести минимальный и максимальный элементы, выборочные оценки математического ожидания, дисперсии, медианы, коэффициентов асимметрии и эксцесса, 25% и 75% - квантилей, 95% - квантиля. Сравнить полученные оценки с теоретическими значениями. Построить ящик с усами (диаграмма размаха), эмпирическую функцию распределения. Построить выборочную гистограмму и поверх нее теоретическую плотность распределения.

```
## [1] "First 10"
```

```
## [1] -0.7335793 -0.3433456 0.5103337 -0.6317212 -3.8446173 0.8355126
```

```
## [7] -0.1017000 0.5477432 0.9819983 -0.5095194
```

```
## [1] "Last 20"
```

```
## [1] 3.61186616 2.53957836 0.03048474 0.92289174 -2.84733233
```

```
## [6] 0.64380818 0.45925527 -2.20228980 -1.64859967 -3.11867508
```

```
## [11] -1.73225809 3.32017532 1.95817751 3.07504422 1.08252548
```

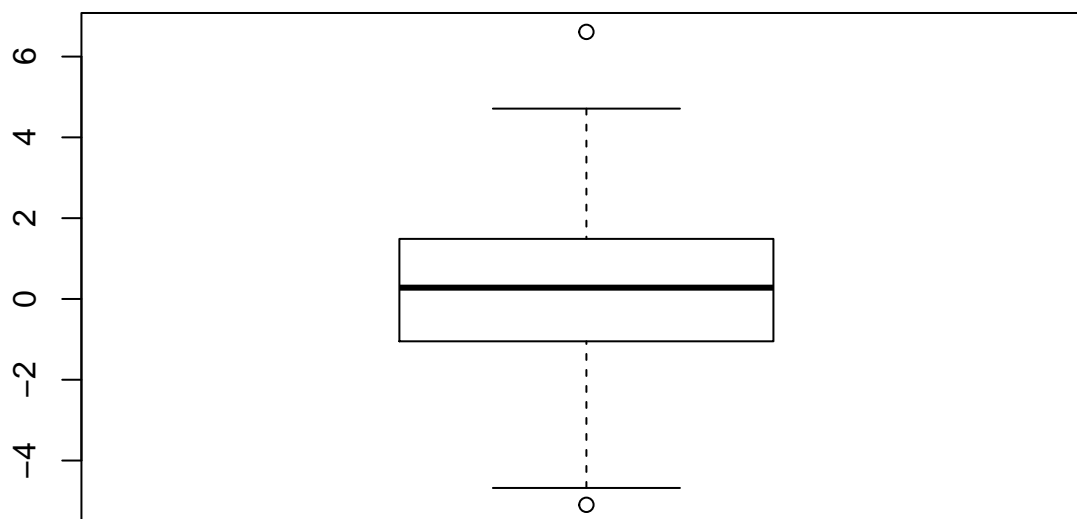
```
## [16] -1.25385040 1.46687596 3.33660827 1.97102803 -1.33431177
```

```
## Min. 1st Qu. Median Mean 3rd Qu. Max. Var Skewness
```

```
## -5.09572 -1.03860 0.27932 0.22289 1.48697 6.61087 3.62162 -0.07814
```

```
## Kurtosis 95% Qu
```

```
## 3.32246 3.08730
```

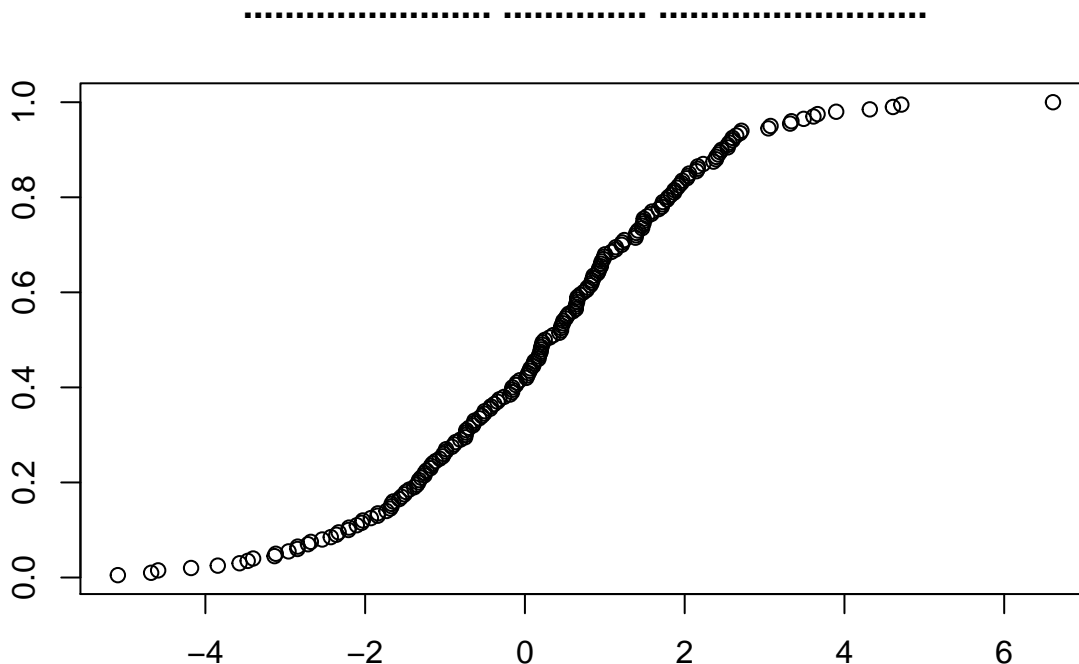


[illegible]

[illegible]

[illegible]

```
## Warning in title(...): conversion failure on 'Эмпирическая функция
## распределения' in 'mbcsToSbcs': dot substituted for <8f>
```



```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d0>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <93>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d0>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <b8>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d1>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <81>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d1>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <82>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
```

```

## <d0>
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <be>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d0>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <b3>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d1>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <80>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d0>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <b0>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d0>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <bc>

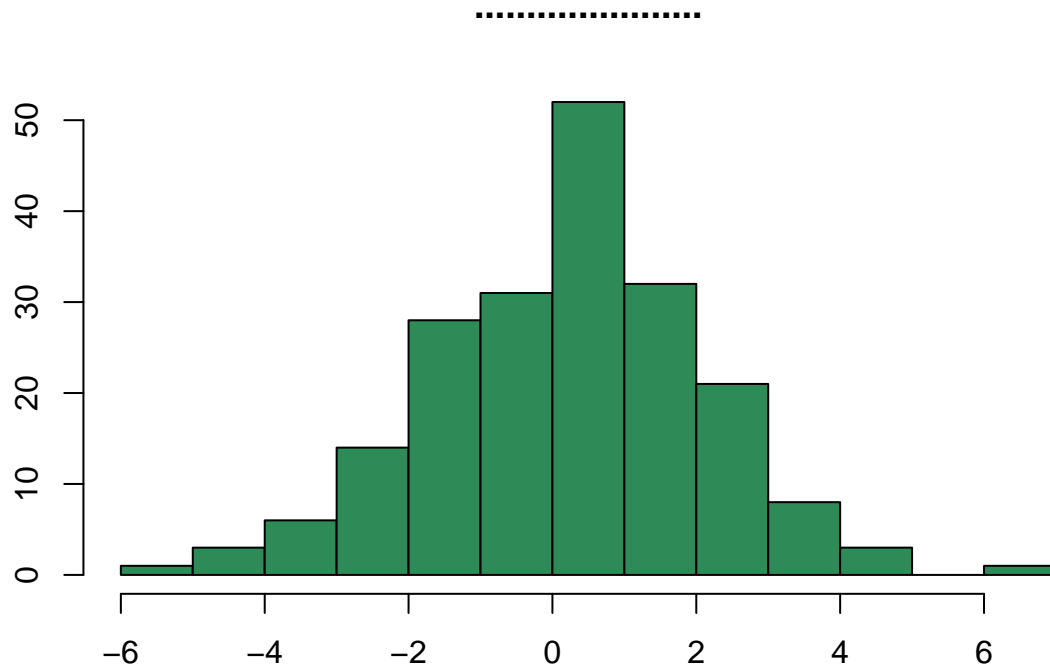
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d0>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <bc>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <d0>

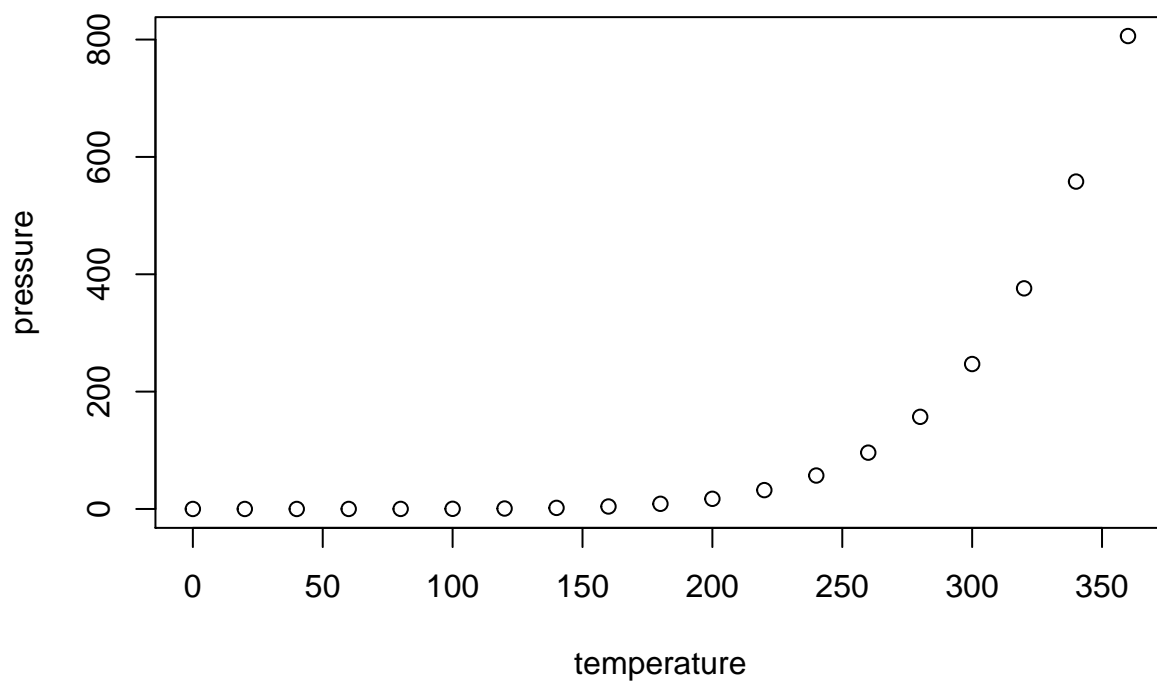
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on 'Гистограмма' in 'mbcsToSbcs': dot substituted for
## <b0>

```



Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

References

Ширяев, А.Н. 1980. “Вероятность. в 2-х кн.” 7 (2). М.: Наука: 179–88. <http://bookshare.net/books/physics/shiryaev-an/1957/files/veroyatnost1957.pdf>.