Probability and Statistics for Engineers Lab Five
TMATH 390

Ben Foster*
Instructor: Julia Eaton

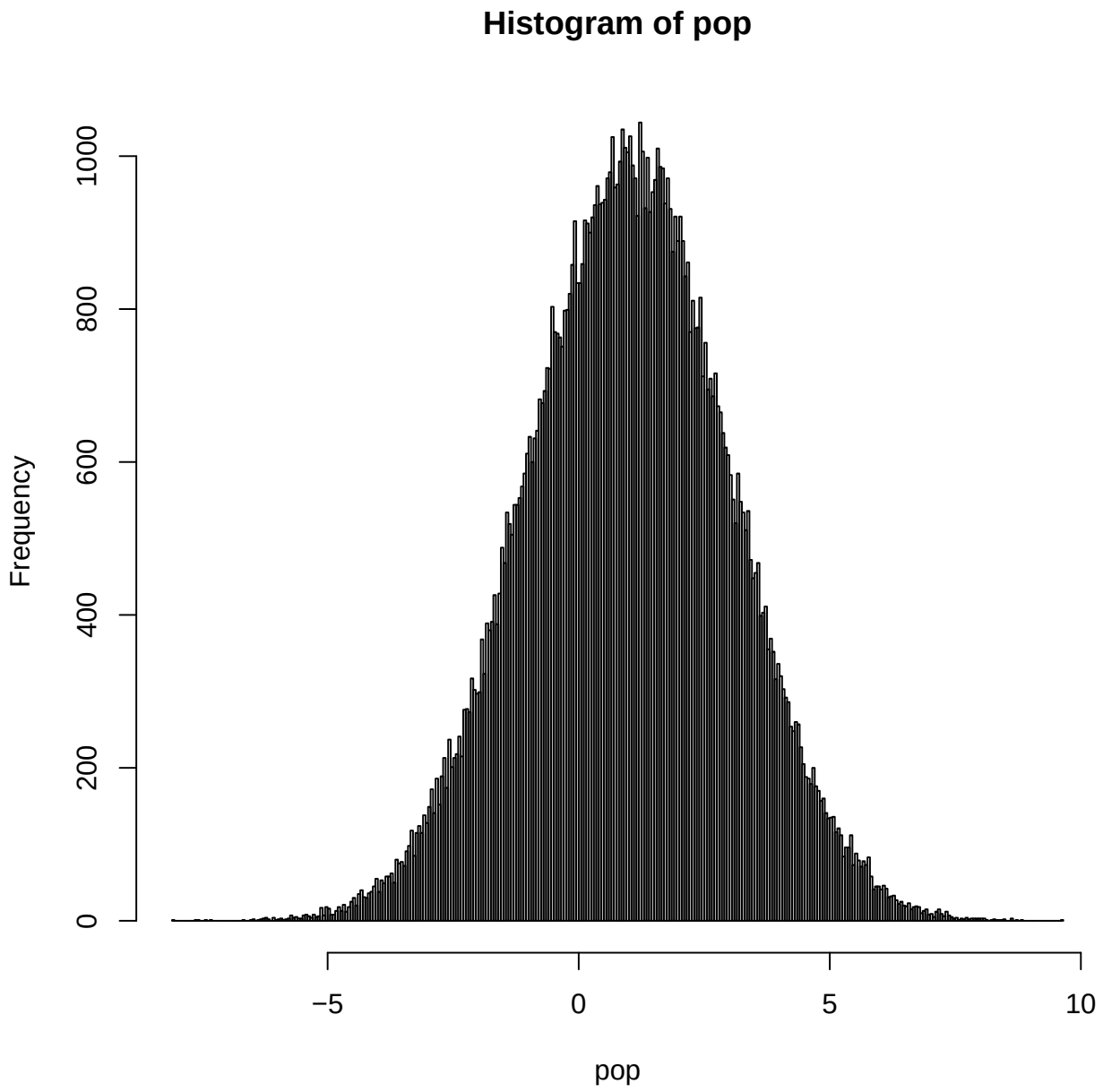
May 22, 2015

*Institute of Technology, University of Washington Tacoma

Contents

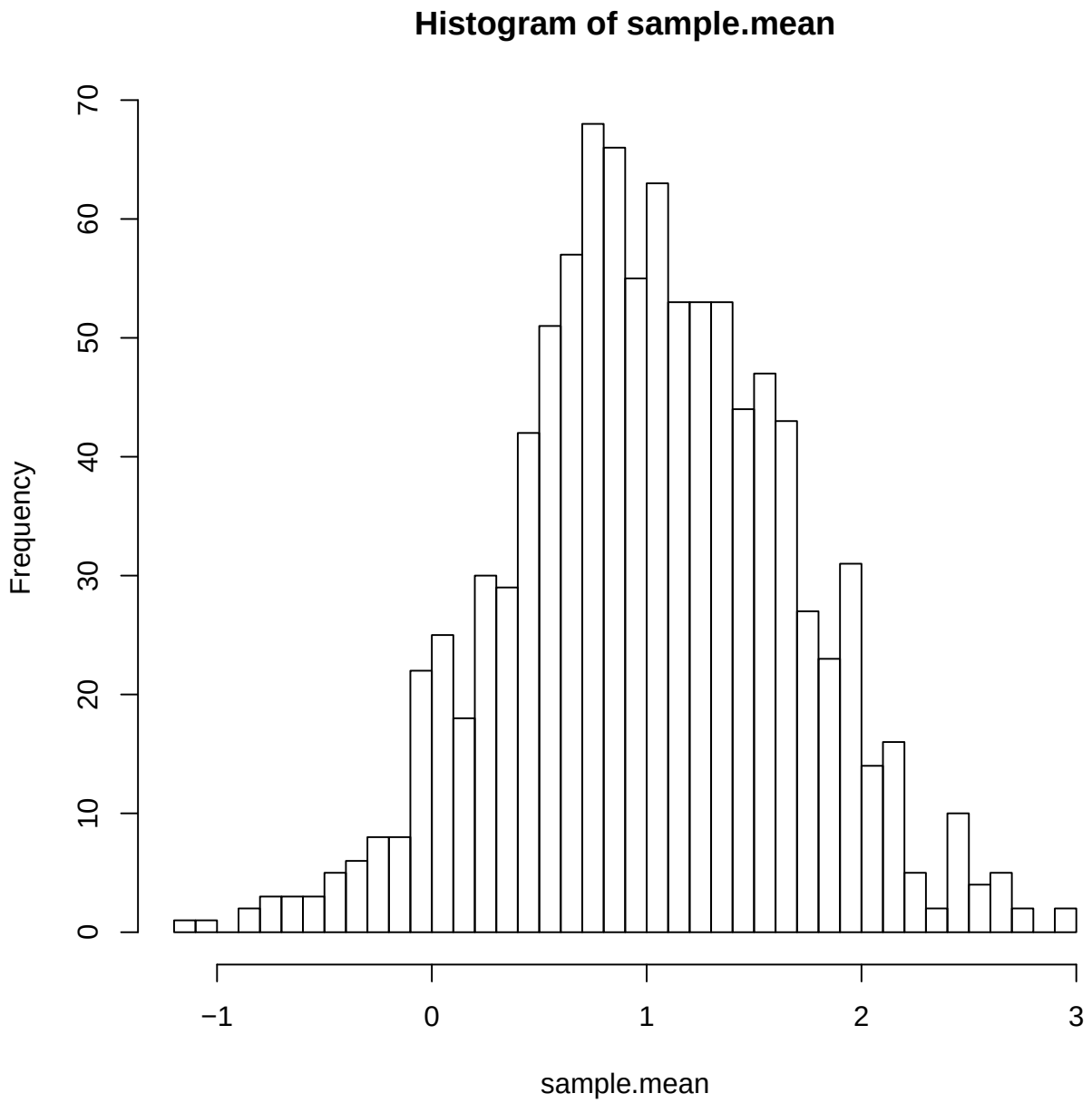
Part 1

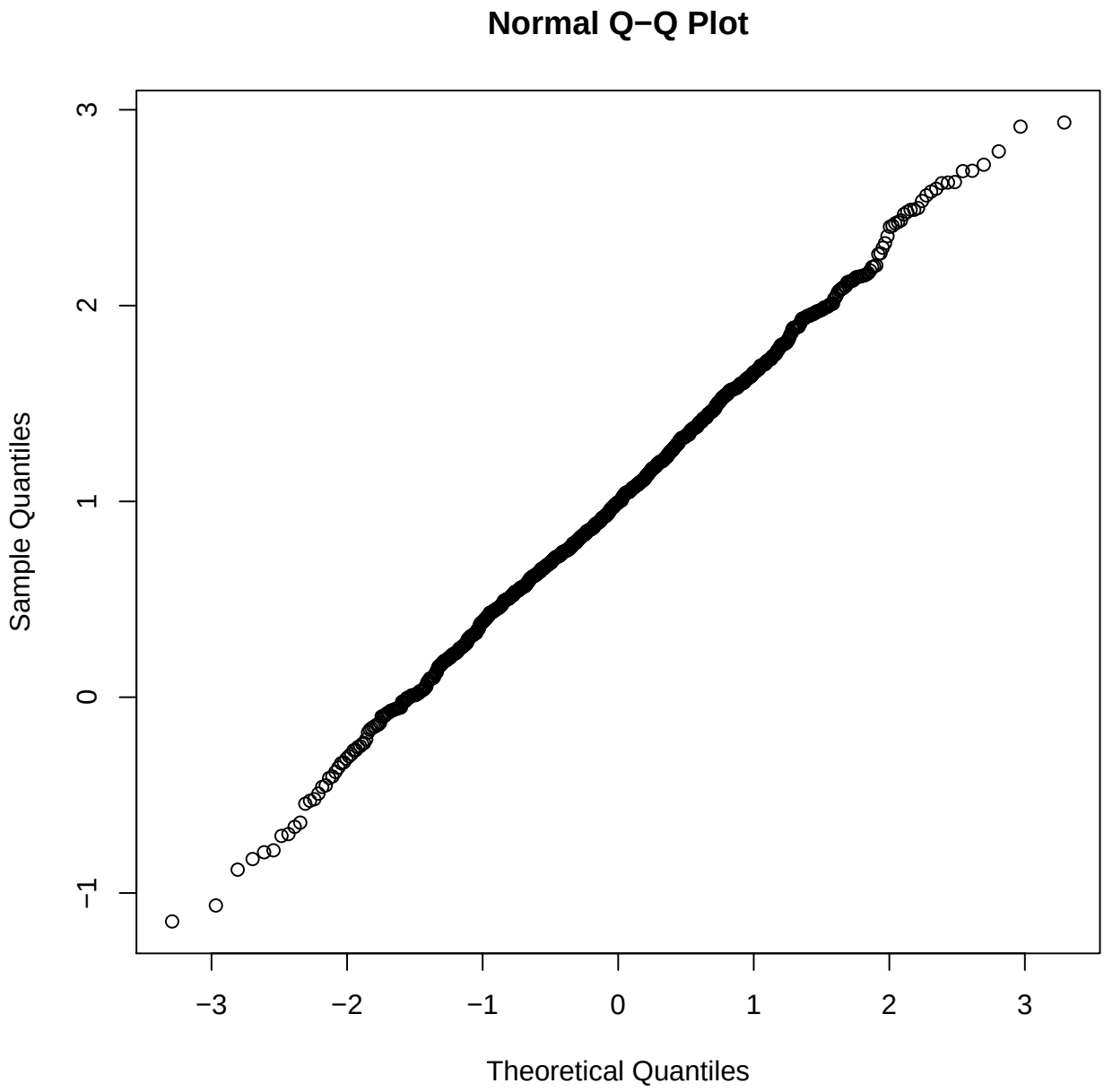
Sampling distribution of the sample mean, when population is normal.



The mean of the sample mean I got was 0.9992485. This is very close to the population mean (0.9955118) but is slightly higher.

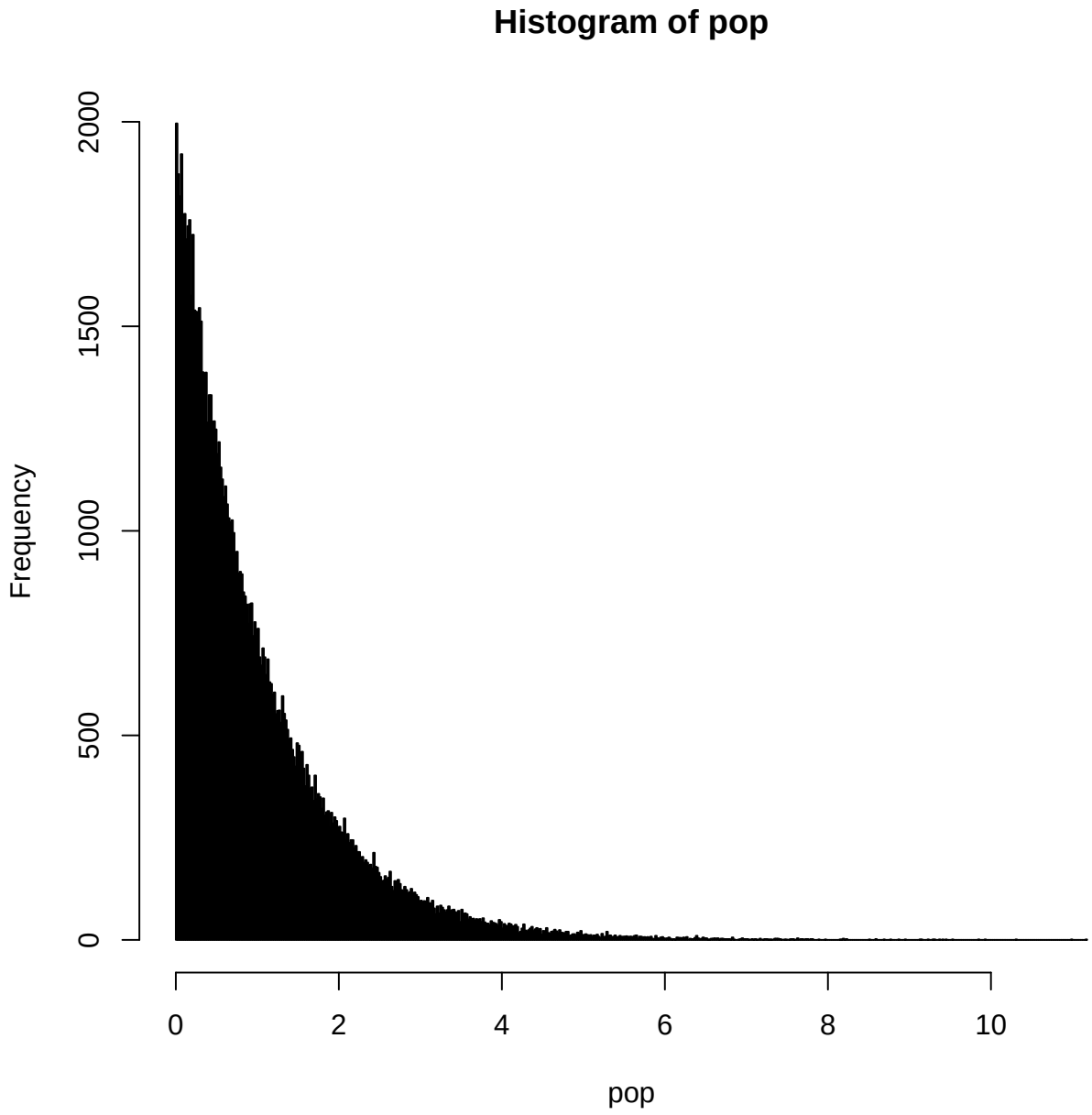
The standard deviation of the sample mean I got was 0.638113 while $\frac{\text{population standard deviation}}{\sqrt{n}} = 0.6346838$ which is very close together.


Histogram of sample.mean
Frequency
0
10
20
30
40
50
60
70
−1
0
1
2
3
sample.mean


Normal Q−Q Plot
Sample Quantiles
Theoretical Quantiles
3
2
1
0
−1
−3
−2
−1
0
1
2
3

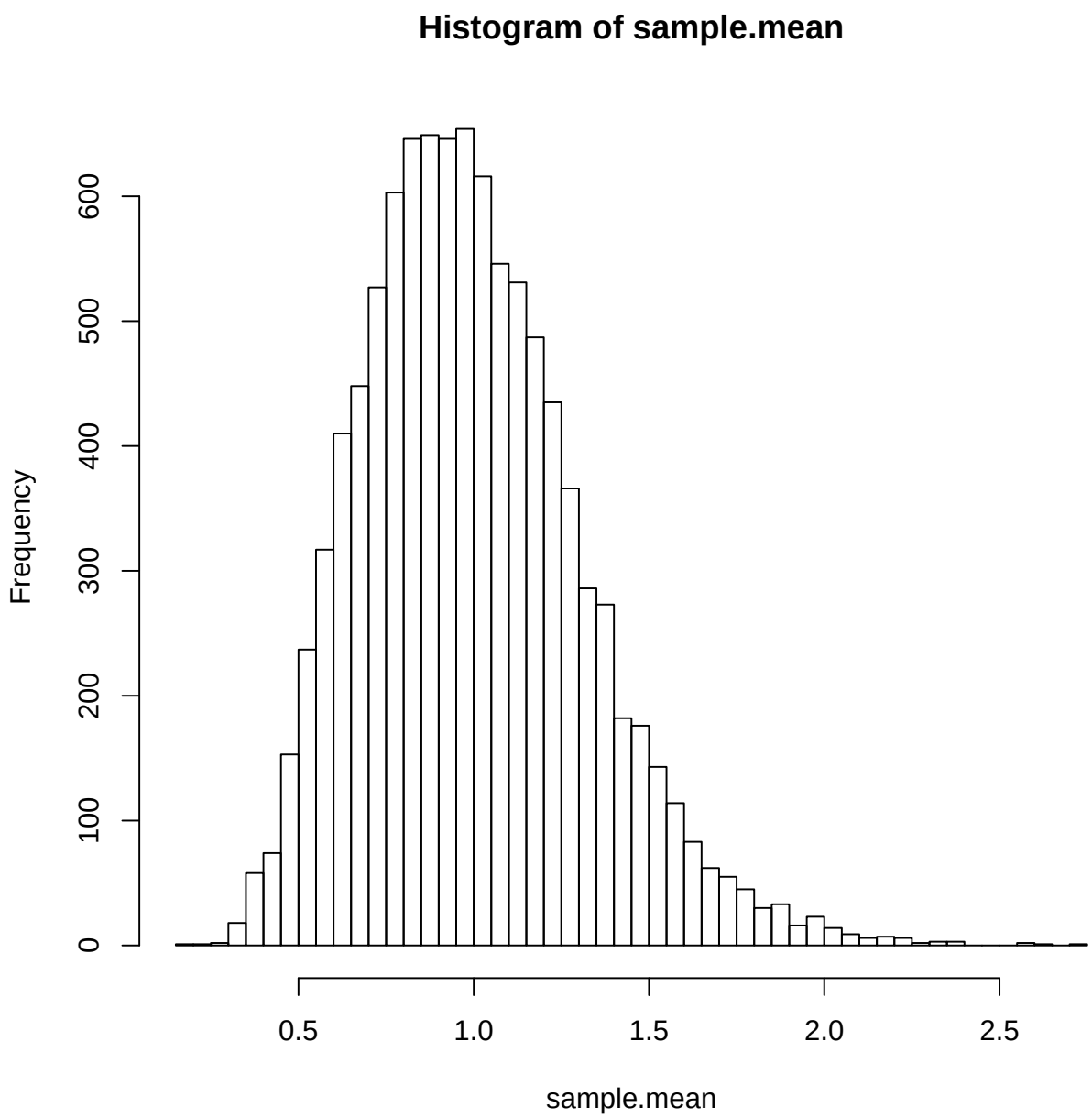
Part 2

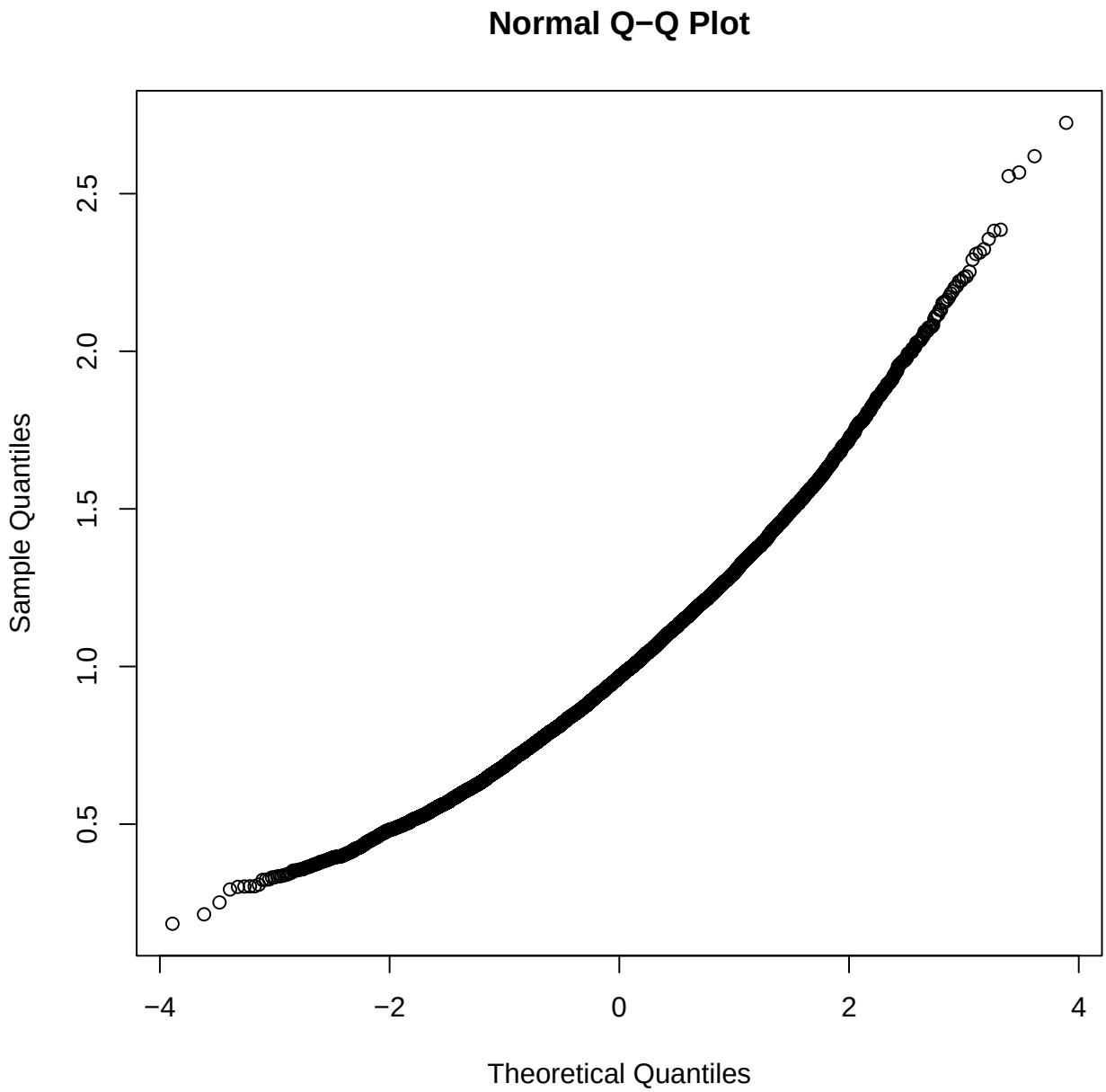
Sampling distribution of the sample mean, when population is NOT normal.



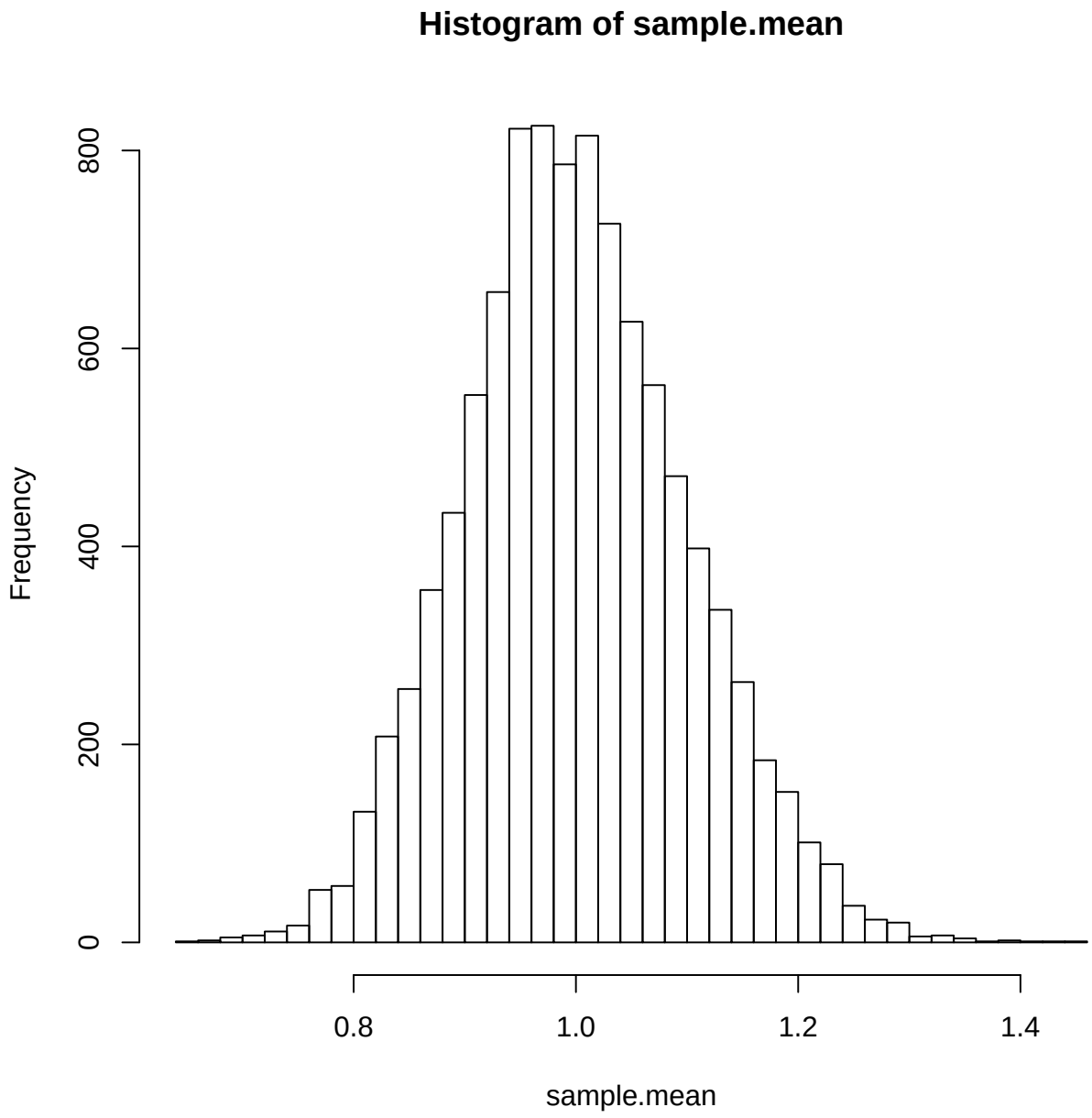
The calculated mean of sample means I got was 1.003286 while the population mean was 0.9955118. Very close together but not exact.

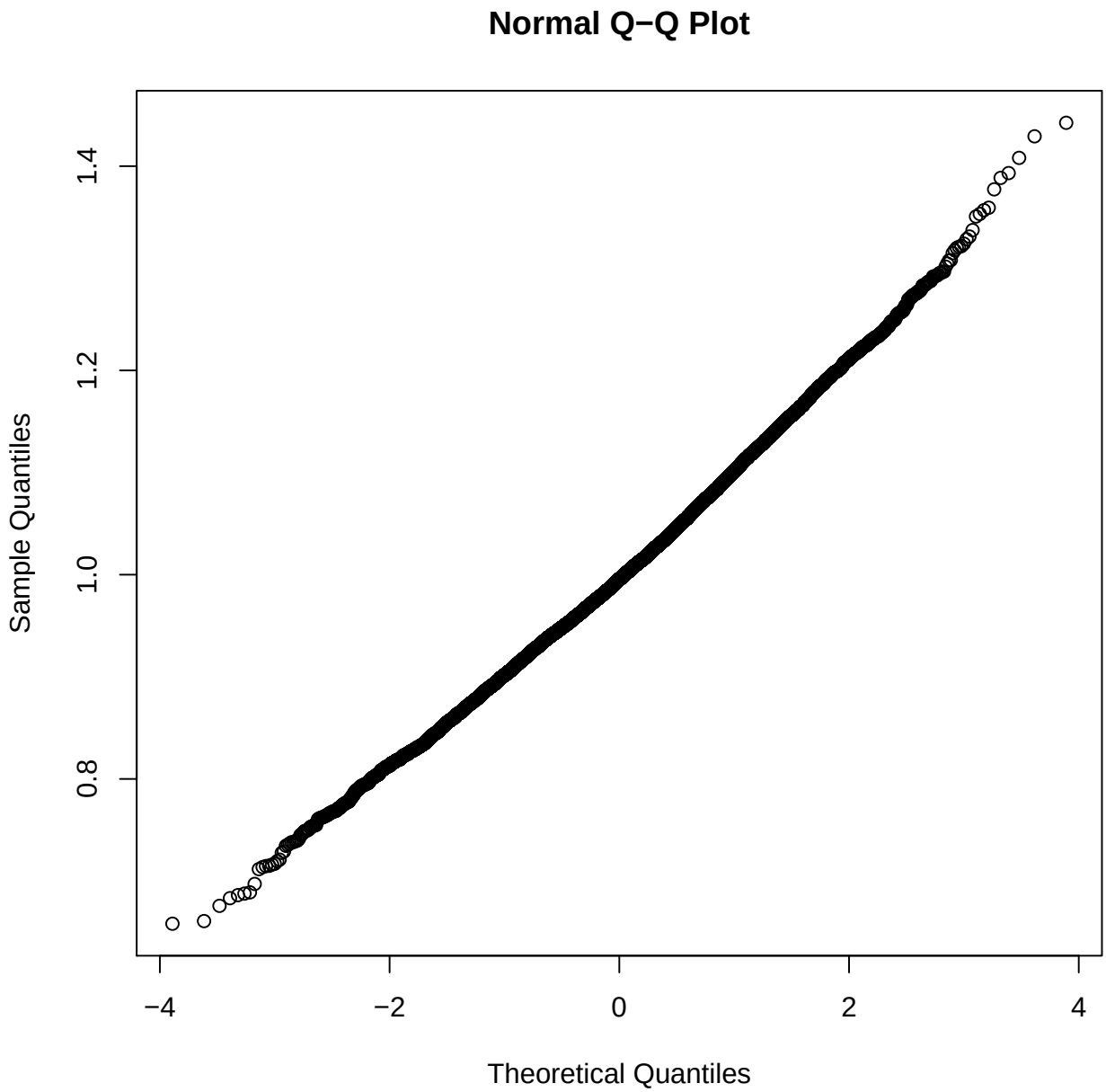
Once again, the population standard deviation and the standard deviation of the sample mean were completely different, but when comparing the standard deviation of the sample mean with $\frac{\text{population standard deviation}}{\sqrt{n}}$ (0.3168481 and 0.3165026 respectively) we get values much closer to each other.


Histogram of sample.mean
Frequency
0
100
200
300
400
500
600
0.5
1.0
1.5
2.0
2.5
sample.mean


Normal Q−Q Plot
Sample Quantiles
Theoretical Quantiles
0.5
1.0
1.5
2.0
2.5
−4
−2
0
2
4

Repeated graphs for sample.size = 100

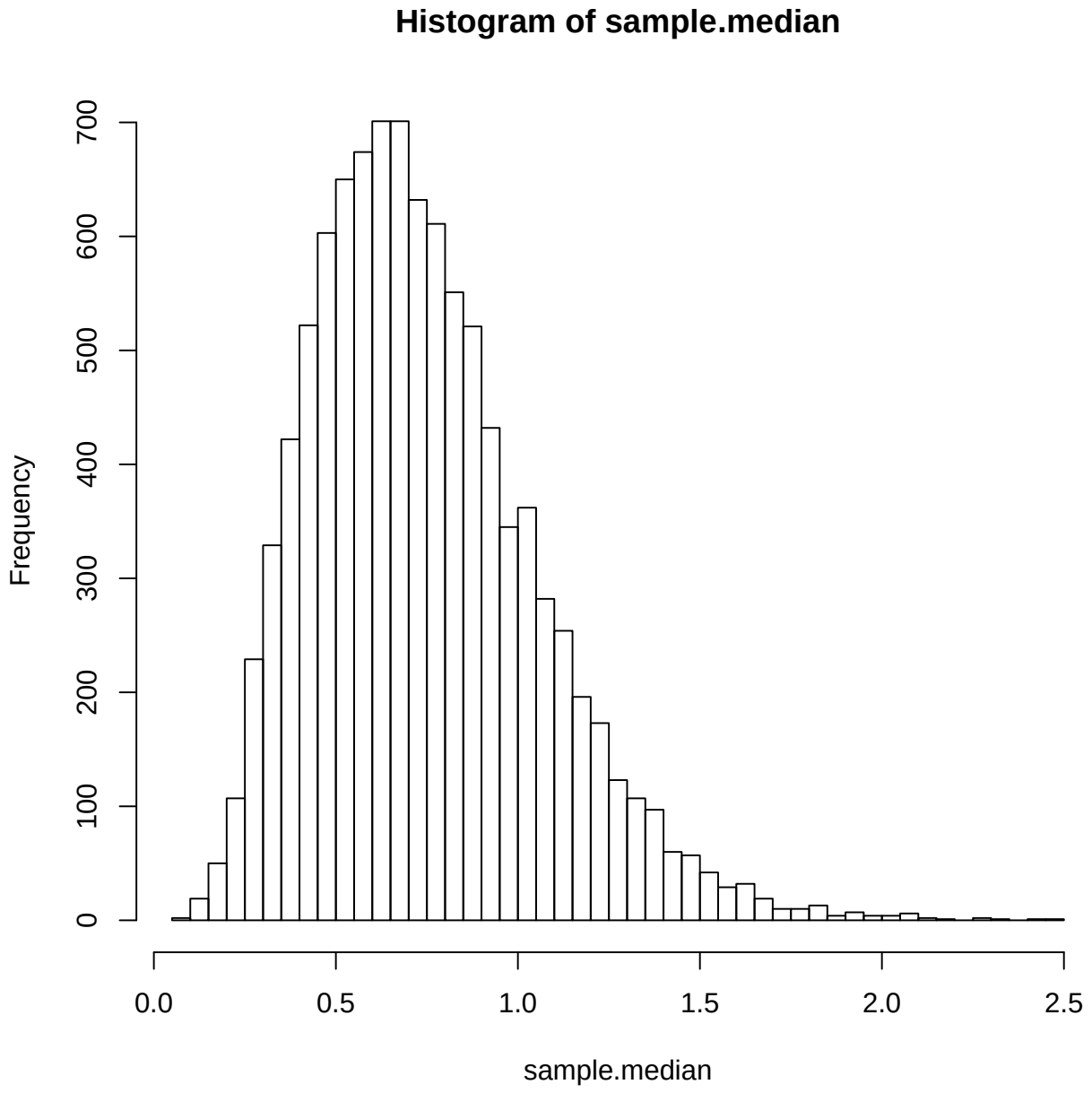


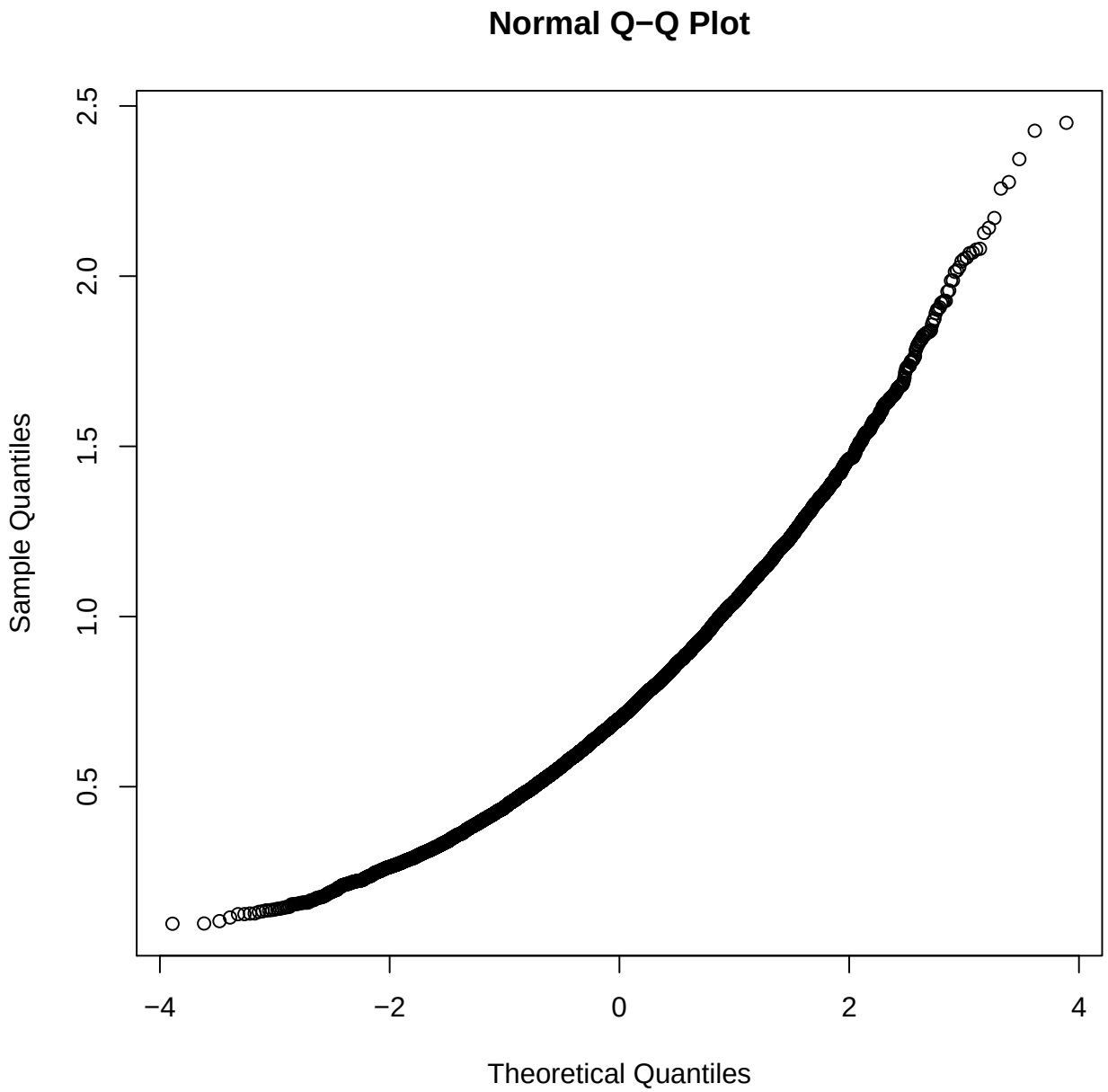

Normal Q−Q Plot
Sample Quantiles
Theoretical Quantiles
0.8
1.0
1.2
1.4
−4
−2
0
2
4

Part 3

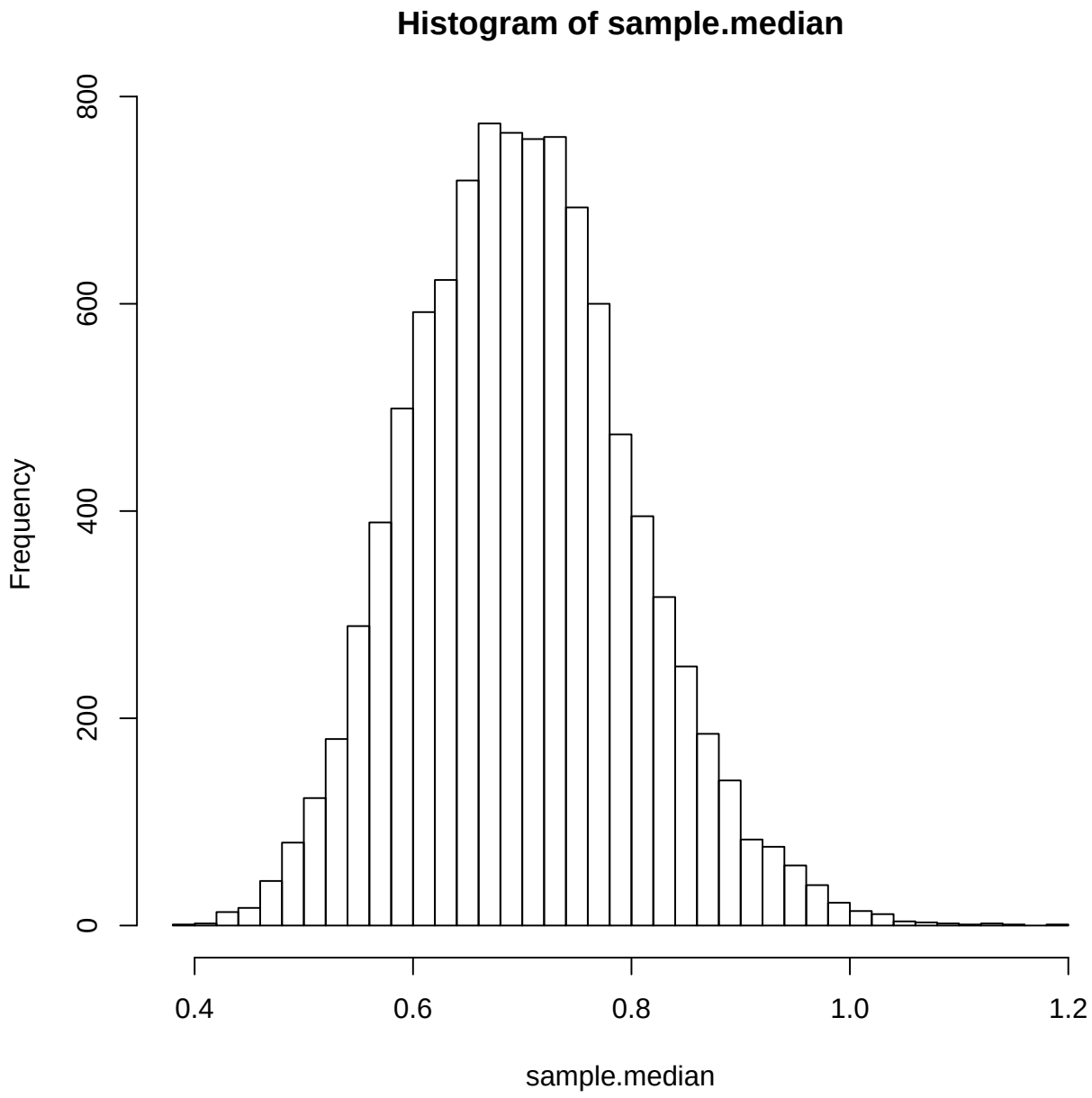
What are the mean and standard deviation of the sampling distribution of the sample median?
What is the sampling distribution of the sample median itself?

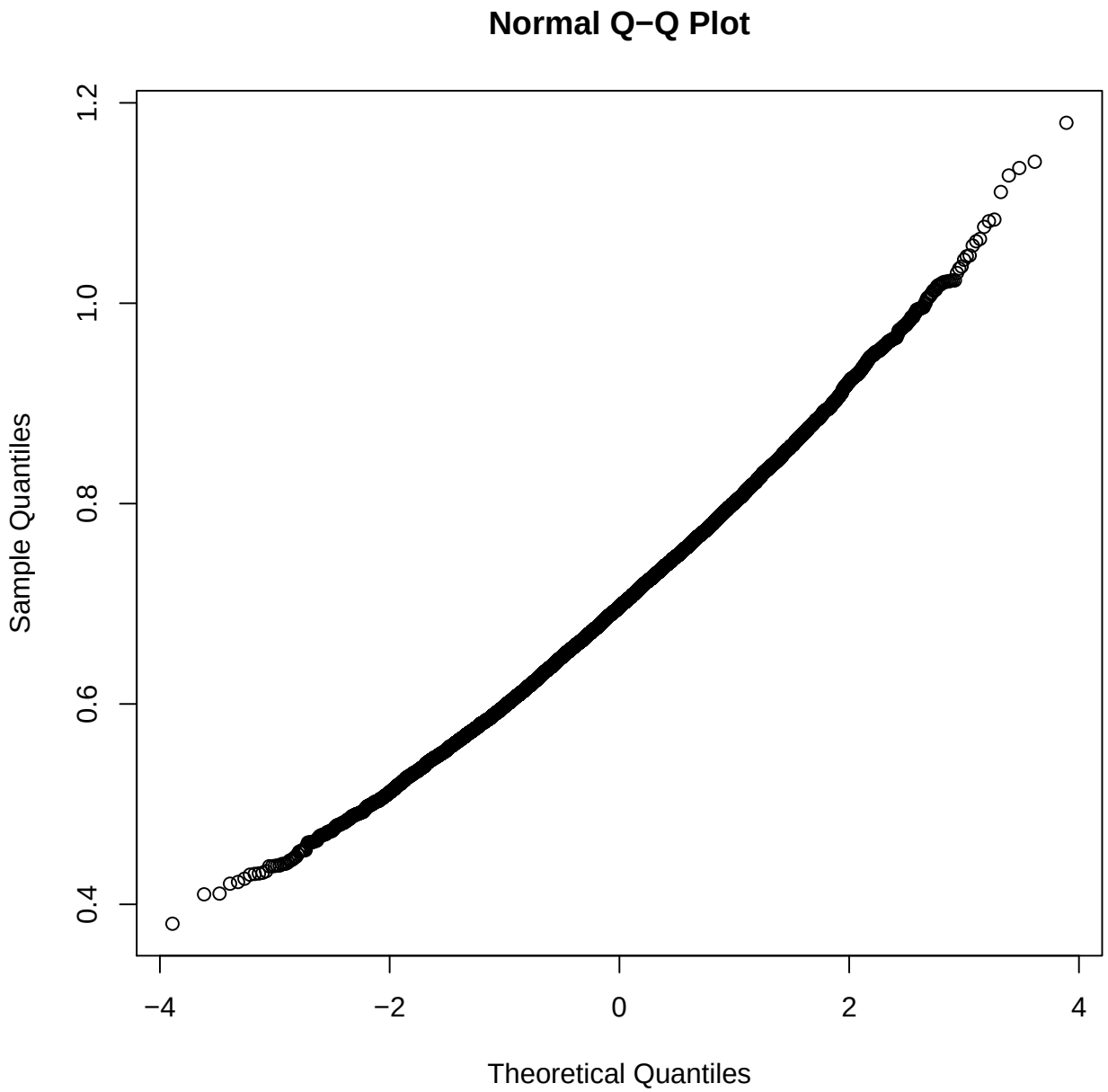
In this case, the mean of sample medians was 0.7446777 compared to the population median of 0.6978674, these numbers are relatively very different.




Normal Q−Q Plot
Sample Quantiles
Theoretical Quantiles
0.5
1.0
1.5
2.0
2.5
−4
−2
0
2
4

Repeated graphs for sample.size = 100





Part 4

Confidence interval for population mean.
By using the code given, the determined confidence interval was (0.9548423, 1.2874648) with a mean of x being equal to 1.121154.

Part 5

Coverage of a Confidence Interval.