Assignment 1

The Old Republic

2023-06-19

```
library(Pareto)
set.seed(100)
Data = data.frame(x.n = rnorm(50000), x.p = rPareto(50000, t=1, alpha=2))
summary(Data)
```

```
##       x.n                x.p
##  Min.   :-4.087893   Min.   :  1.000
##  1st Qu.:-0.671144   1st Qu.:  1.154
##  Median :-0.005919   Median :  1.412
##  Mean   :-0.000208   Mean   :  1.994
##  3rd Qu.: 0.672466   3rd Qu.:  1.992
##  Max.   : 4.363243   Max.   :159.275
```
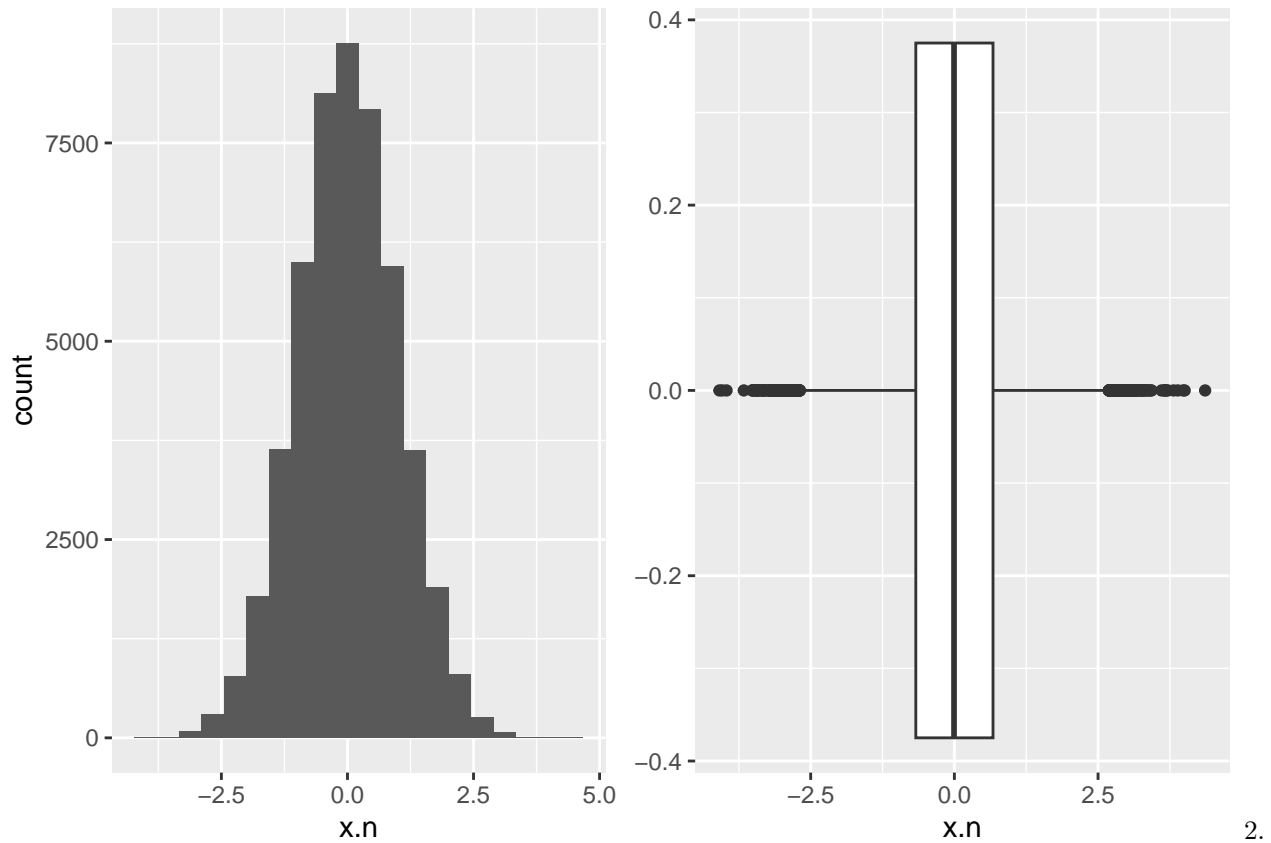
Question 1

1. Histogram and Boxplot of the Variable x.n

```
library(ggplot2)
library(grid)
library(gridExtra)
hist = ggplot(Data, aes(x= x.n)) + geom_histogram(bins = 20)

box = ggplot(Data, aes(x= x.n)) + geom_boxplot()
grid.arrange(hist, box, ncol = 2)
```

2.

The sample mean, and standard deviation of x.n are $-2.0849558 \times 10^{-4}$ and 0.9989658 respectively, we see that these parameters are approximately the same as the standard normal distribution. In fact, as we increase the sample size to infinity, the mean and standard deviation will also approach 0 and 1.