

qbs120_ps6_correction_gibran

Gibran Erlangga

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Question 1

My original solution was correct.

Question 2

My original solution was correct.

Question 3

My original solution was correct.

Question 4

My original solution was correct.

Question 5

My original solution was correct.

Question 6

a)

```
biased.sd = function(x) {  
  biased.var = mean((x-mean(x))^2)  
  return(sqrt(biased.var))  
}  
  
coef.of.skewness = function(x) {  
  b.1 = mean((x - mean(x))^3)/biased.sd(x)^3  
  return (b.1)  
}  
  
# check for correctness  
library(moments)
```

```
x = rnorm(10)
coef.of.skewness(x)
```

```
## [1] 0.2400069
```

```
skewness(x)
```

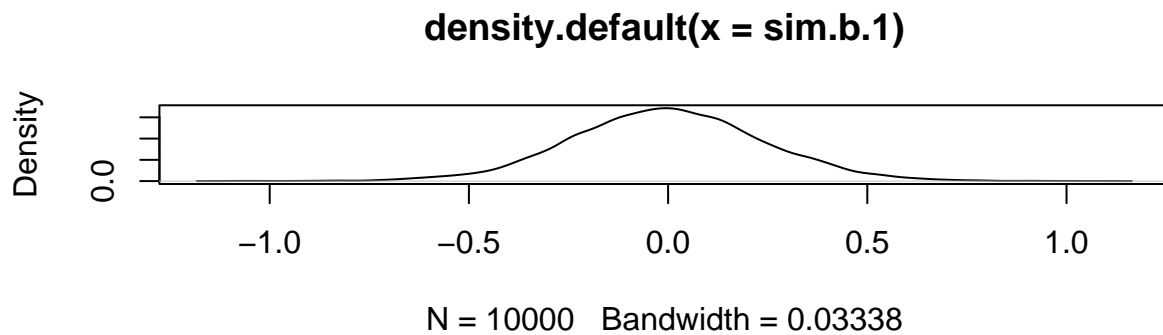
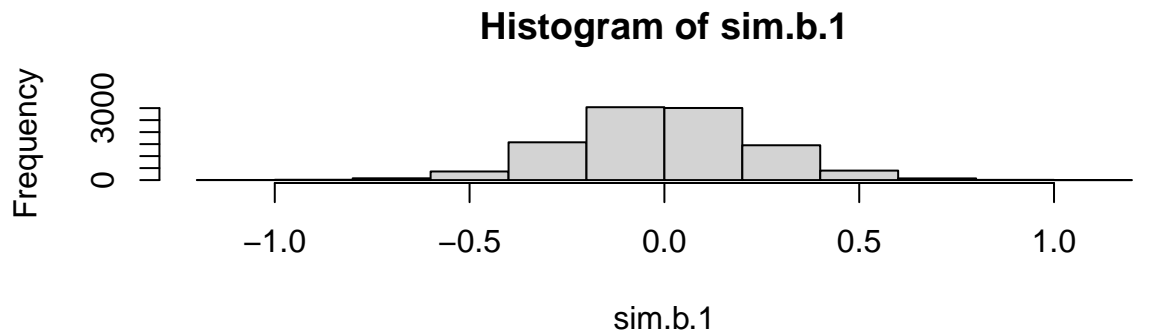
```
## [1] 0.2400069
```

b)

```
B=10000
n=100

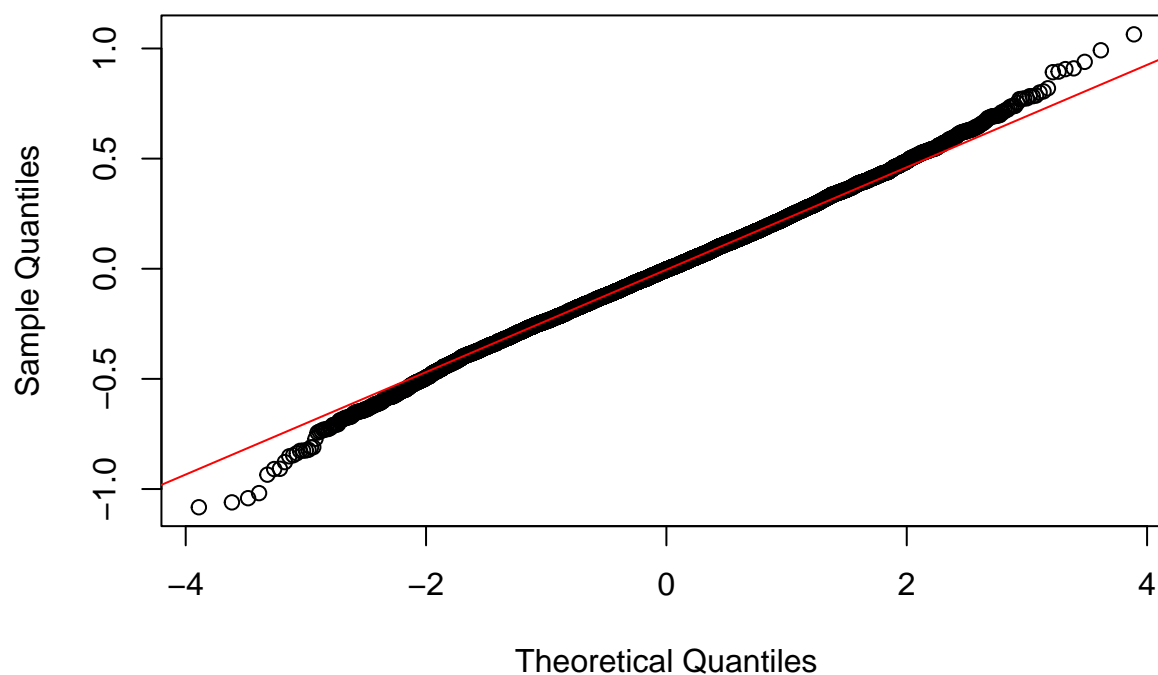
sim.data = matrix(rnorm(B*n), nrow=B, ncol=n)
sim.b.1 = apply(sim.data, 1, coef.of.skewness)

par(mfrow=c(2,1))
hist(sim.b.1)
plot(density(sim.b.1))
```



```
qqnorm(sim.b.1)
qqline(sim.b.1, distribution=qnorm, col="red")
```

Normal Q-Q Plot



```
test.data = matrix(rnorm(1000*100), nrow=1000, ncol=100)
test.b.1 = apply(test.data, 1, coef.of.skewness)
ranked.sim.b.1 = sort(sim.b.1)

simPVal = function(x, ranked.sim.values) {
  n = length(ranked.sim.values)
  smaller.vals = which(ranked.sim.values <= x)
  if (length(smaller.vals) == 0) {
    alpha.low = 0
  } else {
    alpha.low = length(smaller.vals)/n
  }
  larger.vals = which(ranked.sim.values >= x)
  if (length(larger.vals) == 0) {
    alpha.hi = 0
  } else {
    alpha.hi = length(larger.vals)/n
  }
  p.val = 2*min(alpha.low, alpha.hi)
  return(p.val)
}

p_val = sapply(test.b.1, function(x) simPVal(x, ranked.sim.b.1))
p_val[1:5]
```

```
## [1] 0.6094 0.6154 0.9388 0.8866 0.7988
```

d.

```
test.data = matrix(rpois(1000*100, lambda=2), nrow=1000, ncol=100)
test.b.1 = apply(test.data, 1, coef.of.skewness)
p.values = sapply(test.b.1, function(x) simPVal(x, ranked.sim.b.1))
p.values[1:10]
```

```
## [1] 0.0046 0.0202 0.0000 0.0792 0.0264 0.0084 0.0034 0.0016 0.0054 0.0014
```