ZHANGCHE 张澈 16098533-B011-0106

a. 1-1/n. because there are n observations in this set, if the j_{th} is the first bootstrap observation, the probability is 1/n. but j_{th} is not the first one, so the probability is 1-1/n.

b. 1-1/n

c. Because if j_{th} observation is not the first bootstrap observation, the probability is 1-1/n, and there are n bootstrap observations need to choose, so the probability is $(1-1/n)^{n}$.

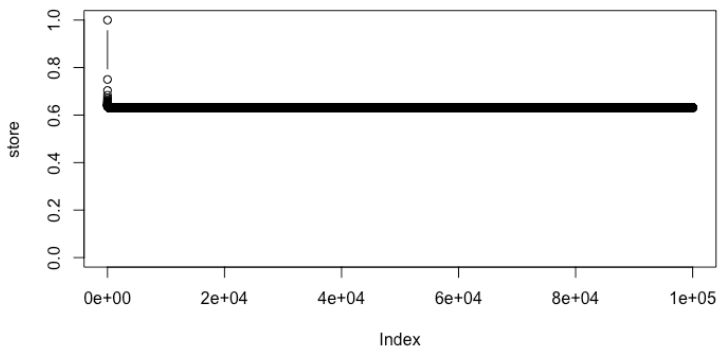
d. 0.67232, $1-(1-1/5)^{5}$

e. 0.63397, $1-(1-1/100)^{100}$

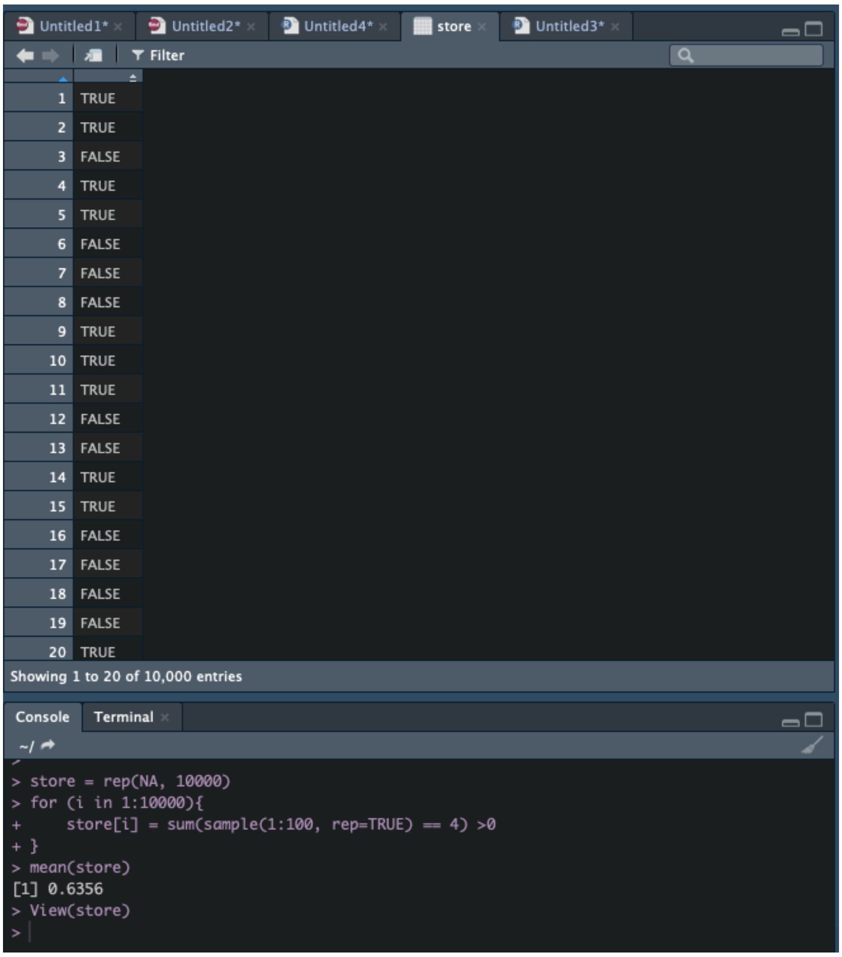
f. 0.63214, $1-(1-1/100000)^{100000}$

g. The result is about 0.632. The probability will decrease from 1 to approximately 0.632 with the increase of n.

```
> mean = rep(NA,100000)
>
>     for (i in 1:100000){
+         store[i] = 1-(1-1/i)^i
+     }
> plot(store, type = "b", ylim = c(0:1))
> mean(store)
[1] 0.6321452
```



h. The result is 0.6356. This is equal to when n =100, the proportion of 4 is in the bootstrap sample. this code means that we take 100 samples from 1-100 with replacement, and we define that if 4 is in this sample set, it is true and we mark it 1, or is 0. We can get the probability, and then we repeat this process 100000 times, we can get the result.


Untitled1*
Untitled2*
Untitled4*
store
Untitled3*
Filter
1 TRUE
2 TRUE
3 FALSE
4 TRUE
5 TRUE
6 FALSE
7 FALSE
8 FALSE
9 TRUE
10 TRUE
11 TRUE
12 FALSE
13 FALSE
14 TRUE
15 TRUE
16 FALSE
17 FALSE
18 FALSE
19 FALSE
20 TRUE
Showing 1 to 20 of 10,000 entries
Console
Terminal
~/
> store = rep(NA, 10000)
> for (i in 1:10000){
+   store[i] = sum(sample(1:100, rep=TRUE) == 4) >0
+ }
> mean(store)
[1] 0.6356
> View(store)
>