Zi Xuan Li

Professor Vahdani

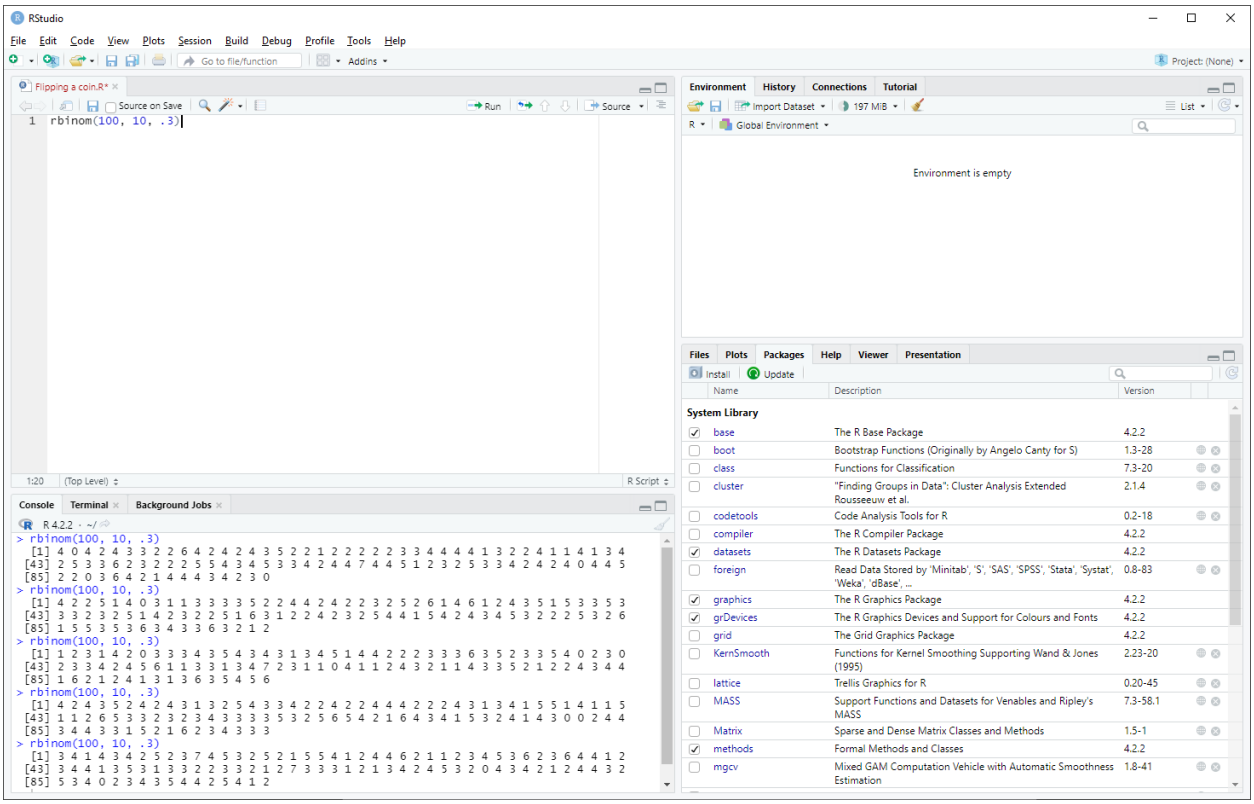
CSC 21700

December 18th, 2022

R Assignment #1

Exercise 1:

Generate 100 experiments of flipping 10 coins, each with 30% probability.

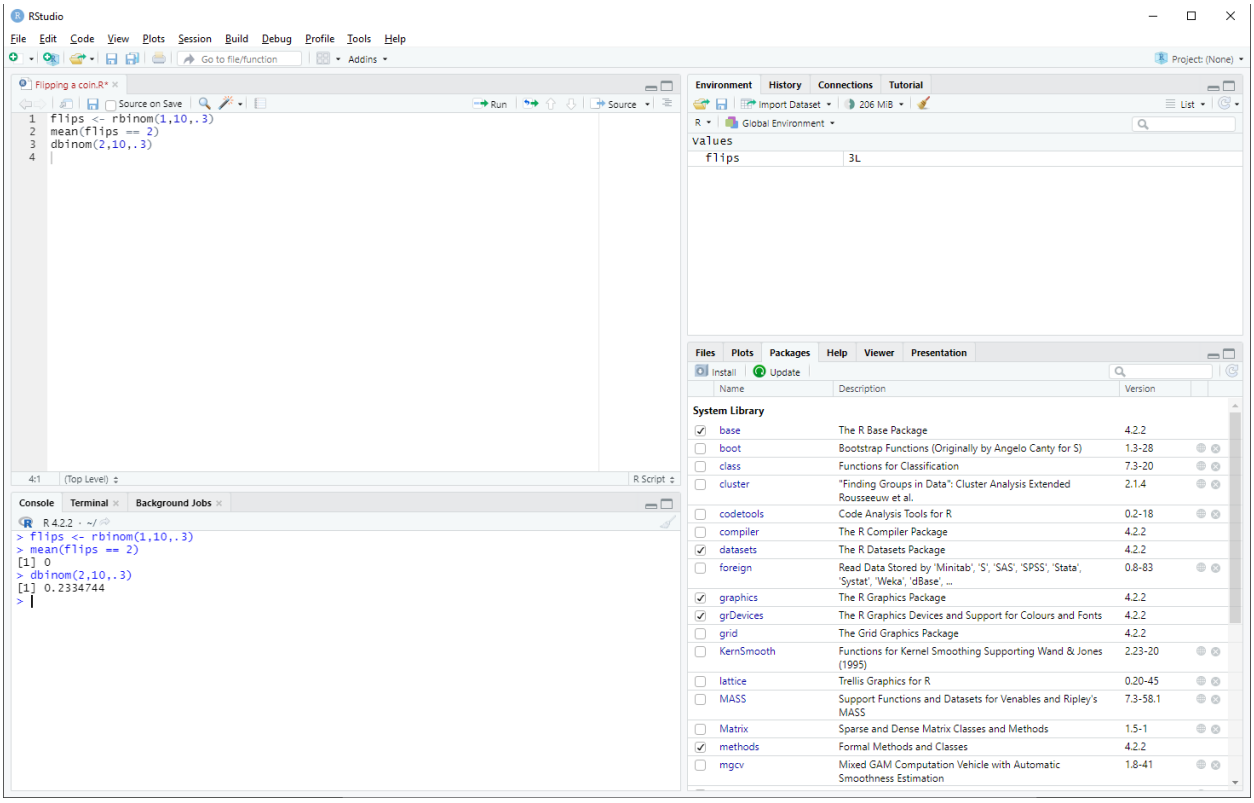


What is the most common number why?

The most common number is 3 because the program is using unfair coins where each toss has a probability of 0.3 of landing on heads.

Exercise 2:

If you flip 10 coins each with a 30% probability of coming up heads, what is the probability exactly 2 of them are heads?

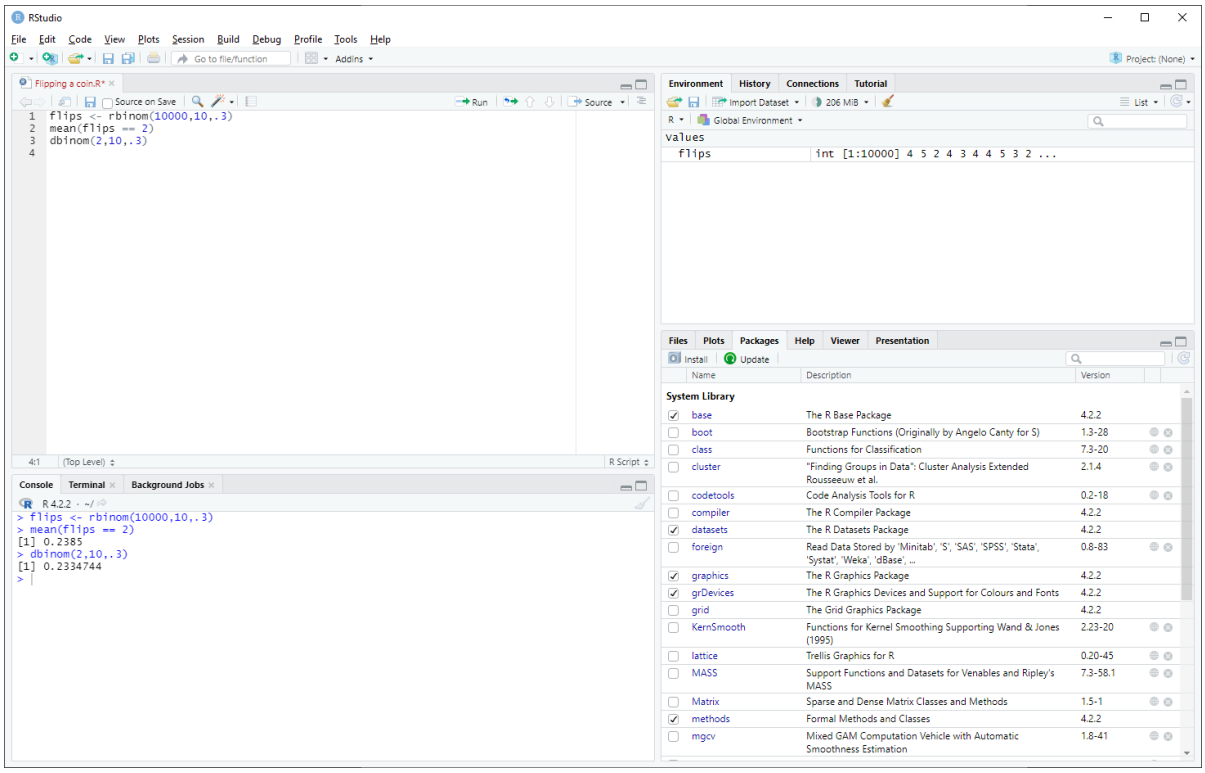


Compare your simulation with the exact calculations

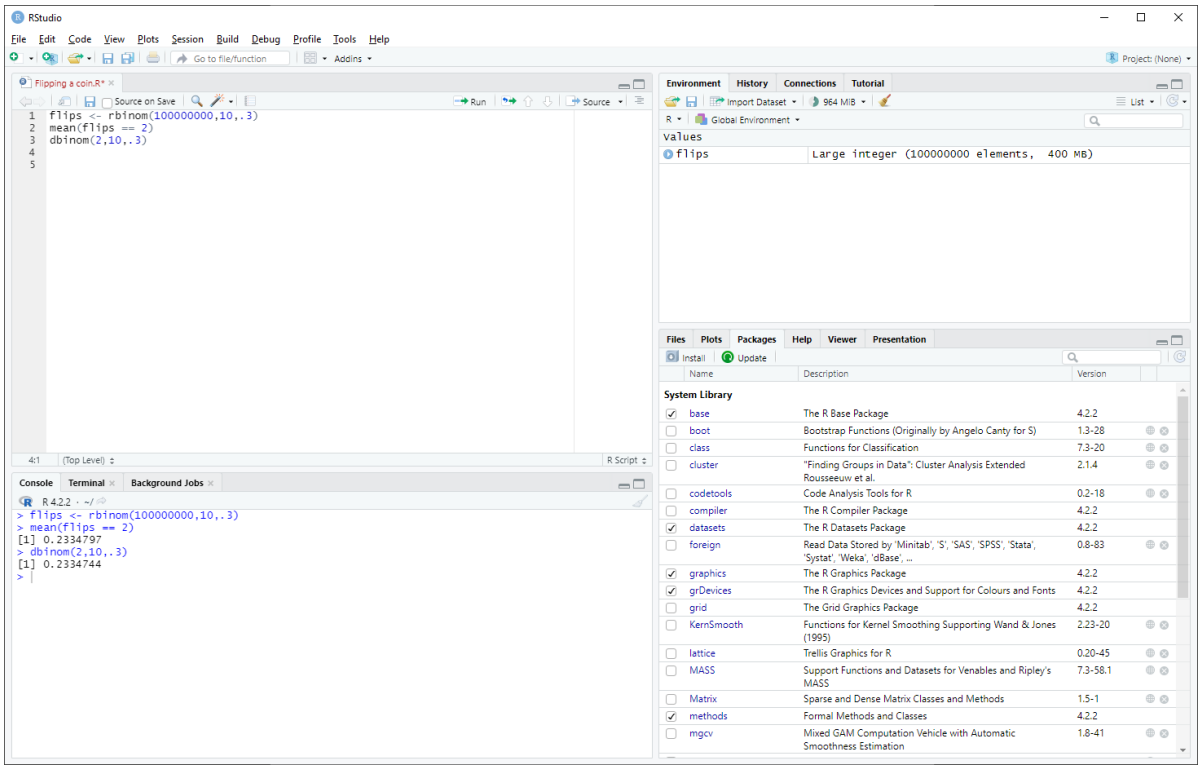
The result from the simulation when the number of experiments was set to 1 was 0, while the exact calculation is 0.2334744.

Exercise 3:

Part a) use 10000 experiments and report the result.



Part b) use 100000000 experiments and report the result.

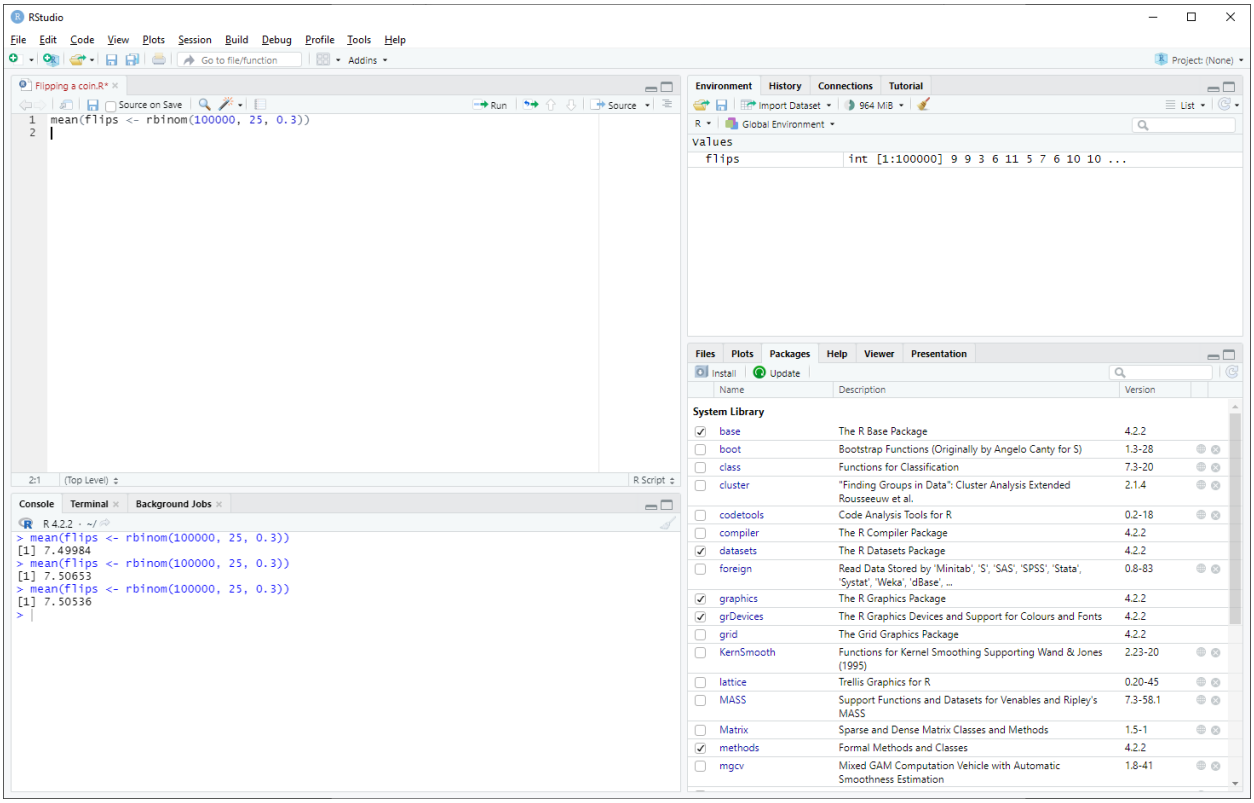


Compare the results of part a and part b, with the exact calculation. What is your conclusion?

After comparing the results of part a & b with their exact calculations respectively. I concluded that the more experiments that were performed, the more accurate the probability of seeing 2 heads when flipping 10 fair coins became.

Exercise 4:

What is the expected value of a binomial distribution where 25 coins are flipped, each having a 30% chance of heads?

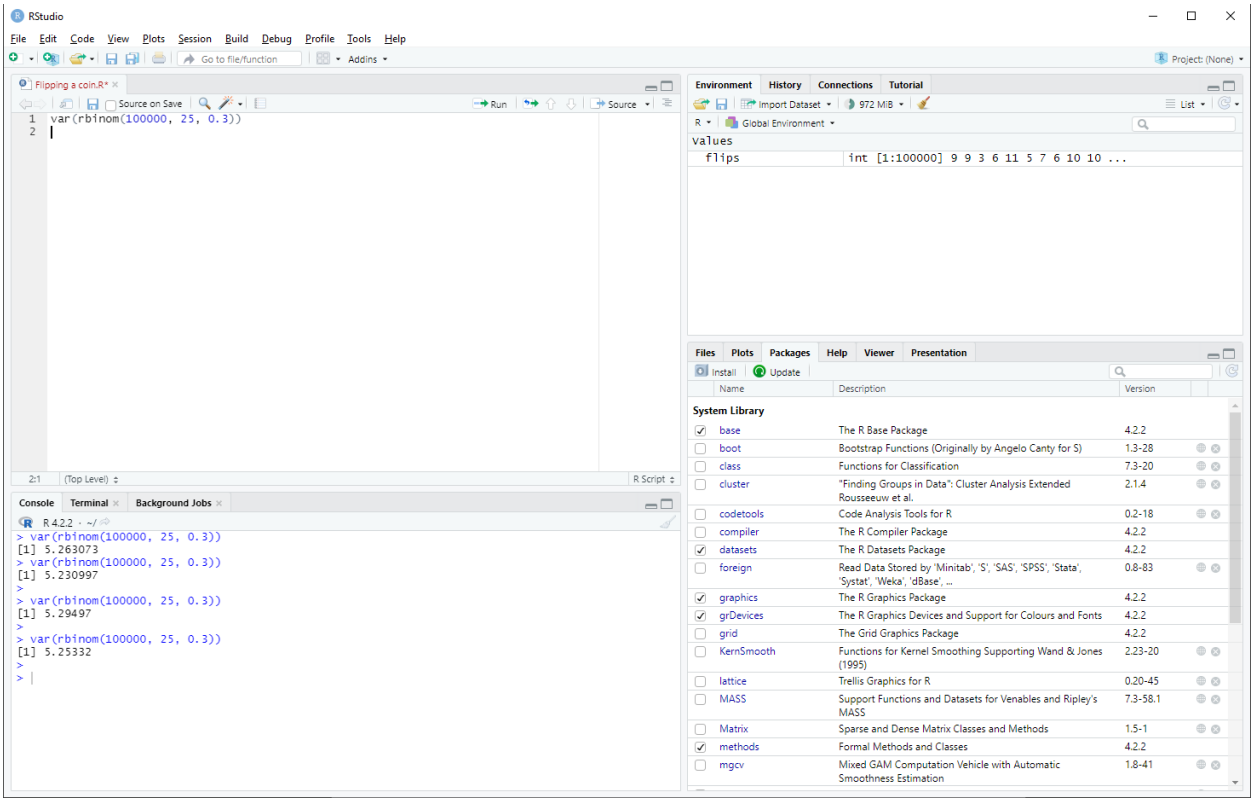


Compare your simulation with the exact calculation.

If $X \sim Binomial$ (25, 0.3), then E[X] is 7.5. The simulation result is 7.49984 and the exact calculation of E[X] is 7.5.

Exercise 5:

What is the variance of a binomial distribution where 25 coins are flipped, each having a 30% chance of heads?



Compare your simulation with the exact calculation.

If $X \sim Binomial$ (25, 0.3), then Var[X] is 5.25. The simulation result is 5.263073 and the exact calculation of Var[X] is 5.25.