I'm running an AB-testing study on the user data from the popular mobile game "Cookie Cats": https://nicthic.fandom.com/wiki/The_Cookie_Cats The game is a free-to-play type of a game.

In the analysis, I will look into the effect of the so-called "gate" onto the user retention. The gate is a paywall, which appears during the course of the game (a user can also wait for a relatively long time as an alternative to making an in-app purchase). The control group has this gate placed at the 30th level, while the treatment group has it at the level 40.

The dataset was generously provided by DataCamp.com and contains 5 variables with 90189 observations. The variables are:
- ❖ userid - each user's unique identifier
- ❖ version - this is a binary variable, which shows which group the user belongs to (the control group or the treatment group). We have a roughly equal number of users in each of the groups
- ❖ sum_gamerounds - the total number of game rounds played by the user during the 14 days after installing
- ❖ retention_1 - binary variable (a boolean) showing whether or not the user returned to the game and actually played it the next day following the initial instal of the game
- ❖ retention_7 - binary variable (a boolean) showing whether or not the user returned to the game and actually played it on the seventh day following the initial instal of the game

It is interesting to look at the quantity of the gamerounds that most users play in the first 14 days. Very few users play very many game rounds:
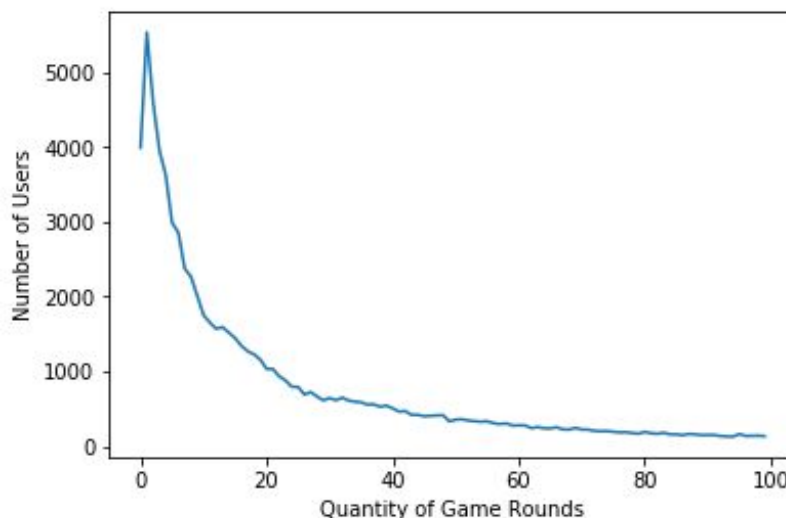

A quick summary statistics on the data:
- about 45% of users return to play the game the next day after installing it, and about 19% return to play it after 7 days
- the control and treatment groups have a roughly equal percents in the 1 day and the 7 day retention. However, there was a slight decrease in both of the retention metrics when the gate was moved from level 30 to 40

To test whether or not there indeed is decrease in retention in our dataset, I will repeat this statistics computation on the 5000 randomly generated subsets of the dataset (I will repeatedly resample the whole dataset with replacement). Indeed, there is a decrease in both of the retention metrics across all of the subsamples of the data:
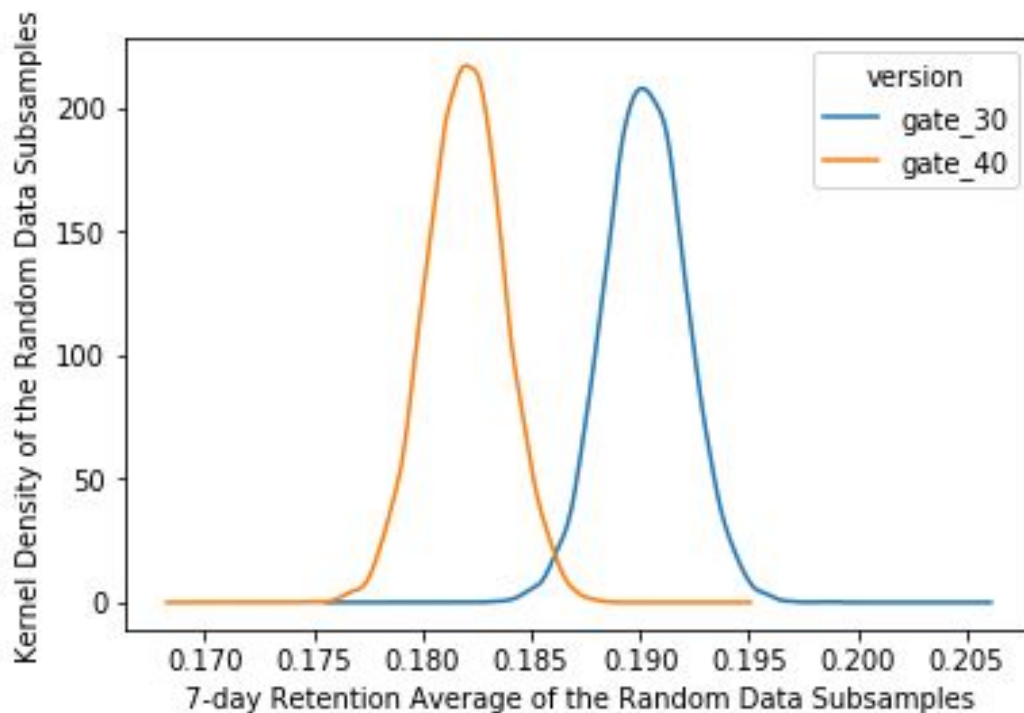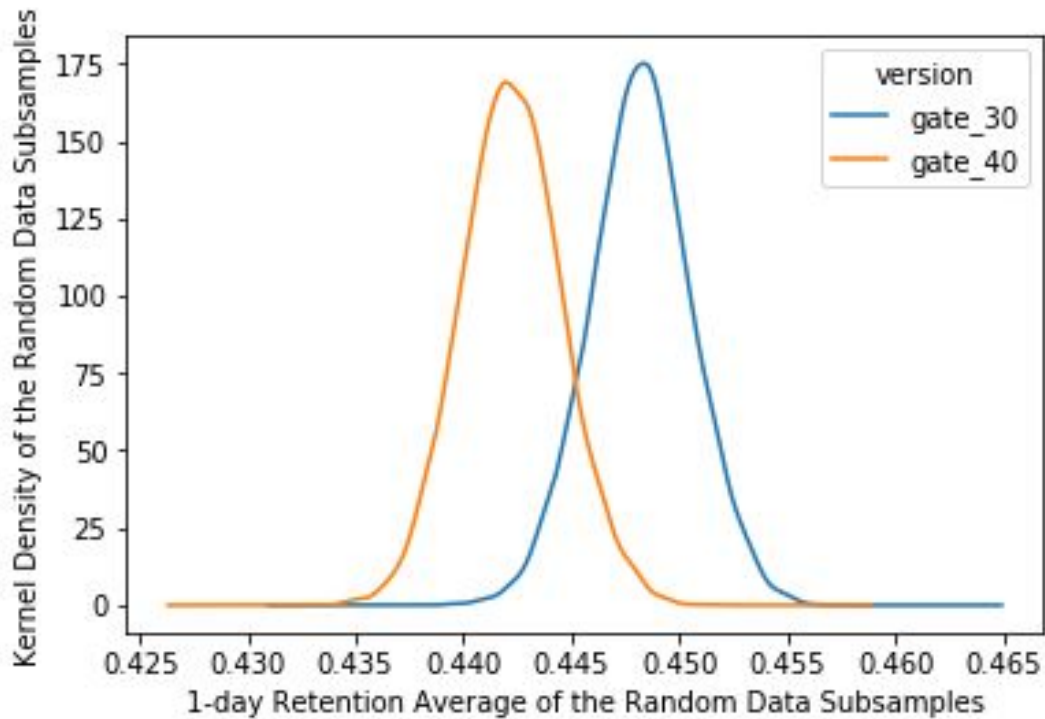
Let's also plot the distribution of the percentage of the difference we have between the two groups in each of the two retention metrics:
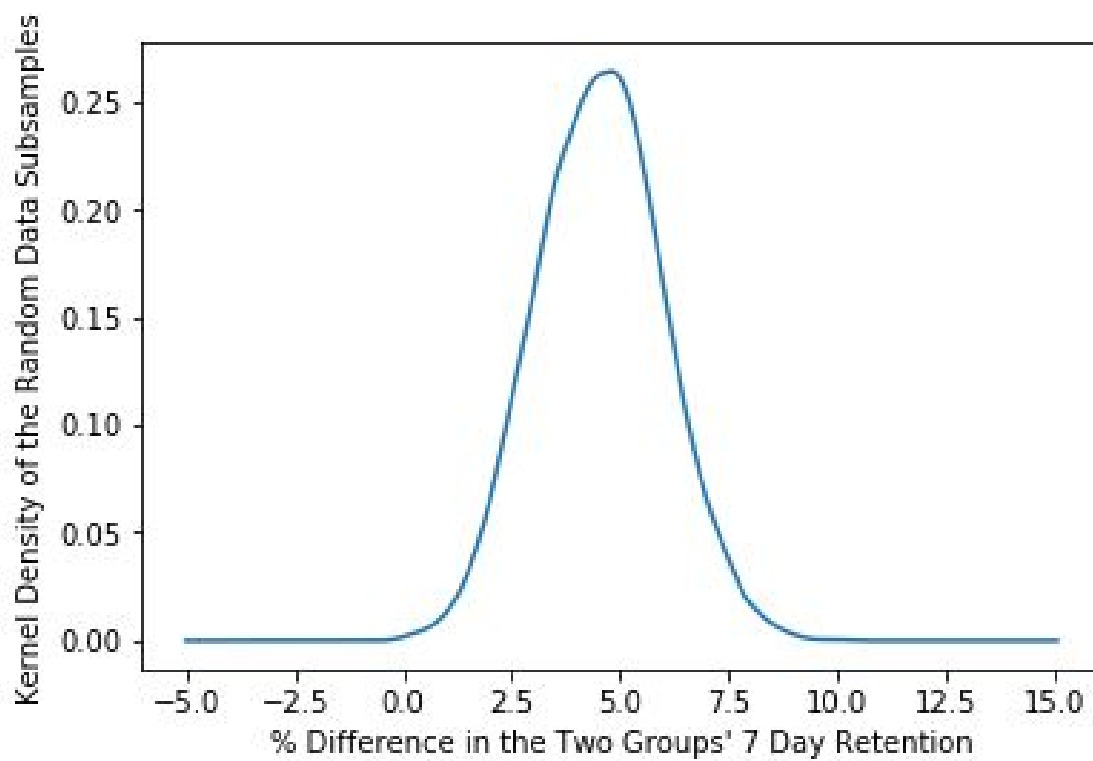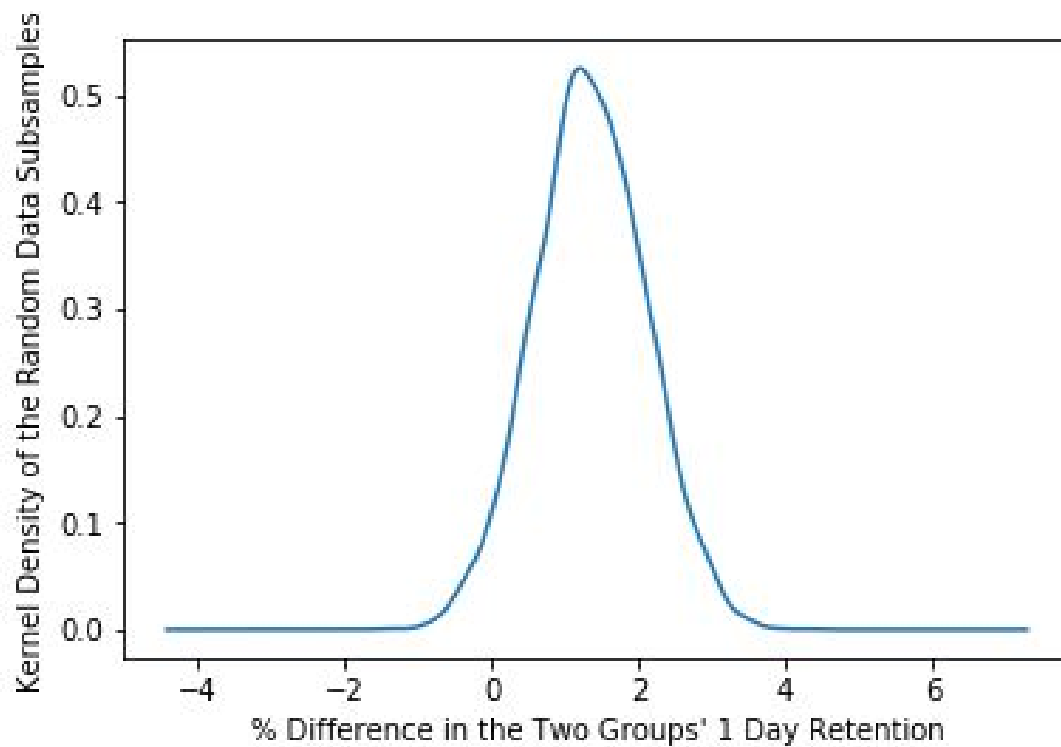
I had also computed the percent of randomly generated subsamples in which the average difference in the retention between the two gates had higher retention at the earlier gate:
- for the 1 day retention it was the case in 96.12% of the time
- for the 7 day retention it was the case in 99.96% of the time

Finally, there indeed is enough evidence that retention decreases as we move the gate from level 30 to level 40. One explanation is that the player is getting "bored" of the game relatively quickly. In case the player spends money at the paywall to keep playing, they value the enjoyment of the game more as they paid for it not only with their time. And, in the case when player chooses to wait at the onset of the paywall, the urge to play is growing as they are waiting. Therefore, to maintain the retention metrics at the higher levels, it is better to keep the gate at an earlier level.