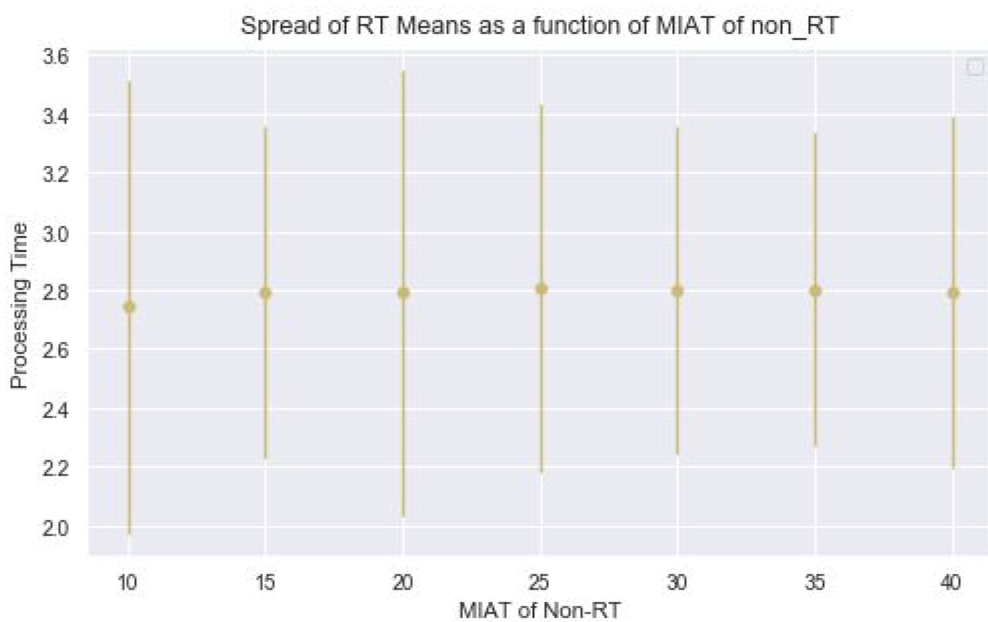
IOT Analytics - Simulation Task 3
By Karan Rakesh (krakesh)

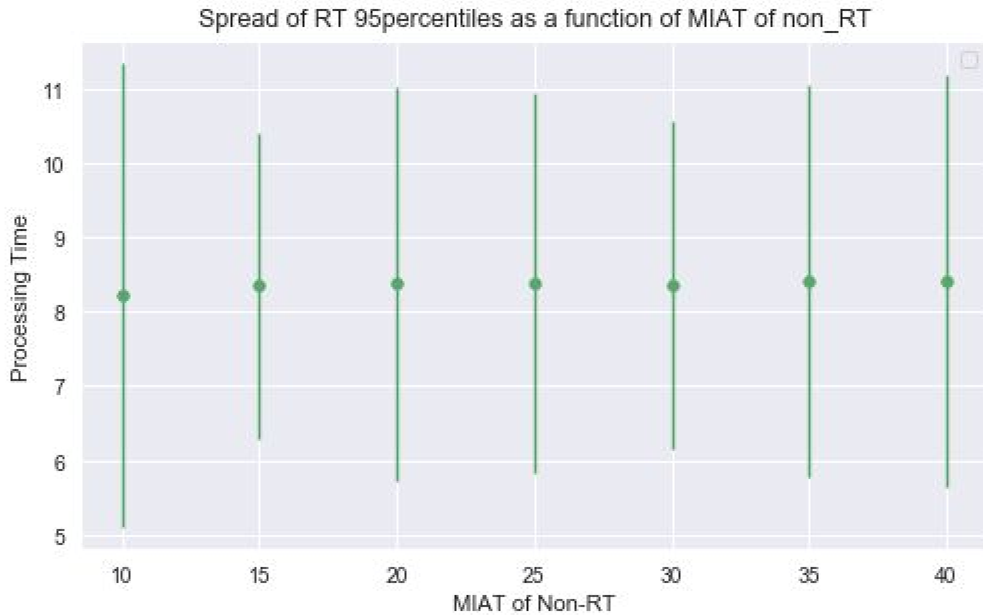
For task 3, I made changes to the simulation code to collect the processing time for the Real-time as well as non-Real Time messages. On reaching the batch size, the mean of this batch was stored and the 95th percentile was computed and stored. Once the required number of batches is reached, the information is returned. This information was then used to compute the mean, standard deviation and confidence intervals for the mean and the 95th percentile. This is then graphed using the seaborn and matplotlib.

Summary of the findings from the results:

- For the most part, irrespective of the variation in non-RT interval, the mean RT processing time stayed the same. This is expected since they have the highest priority and only need to wait for another RT message to complete before they can be processed.

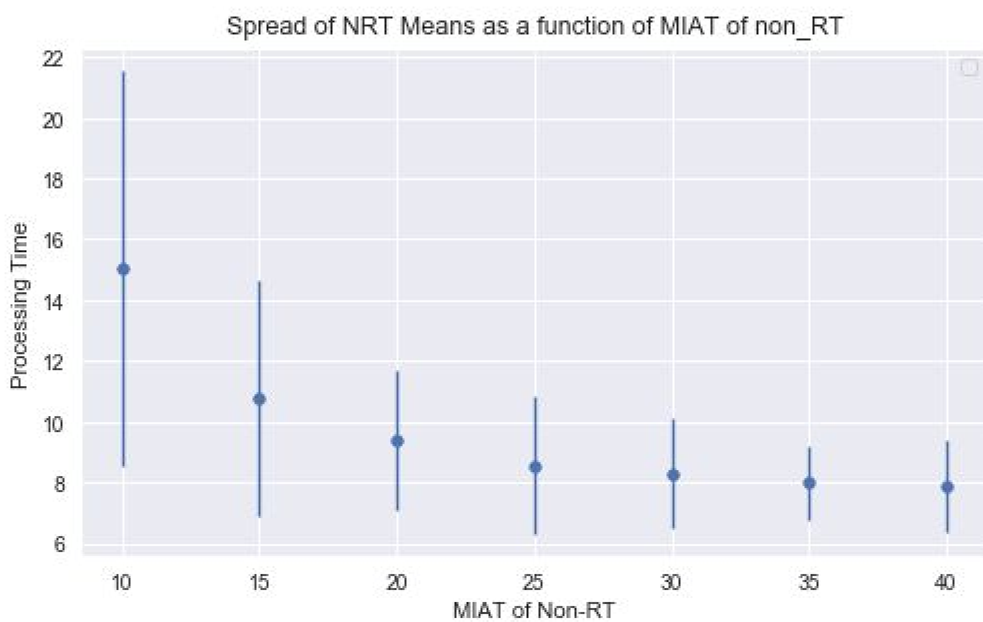


- The 95th percentile for RT messages also remained static across all the different iterations. This can again be explained by the same reasons from the previous point.

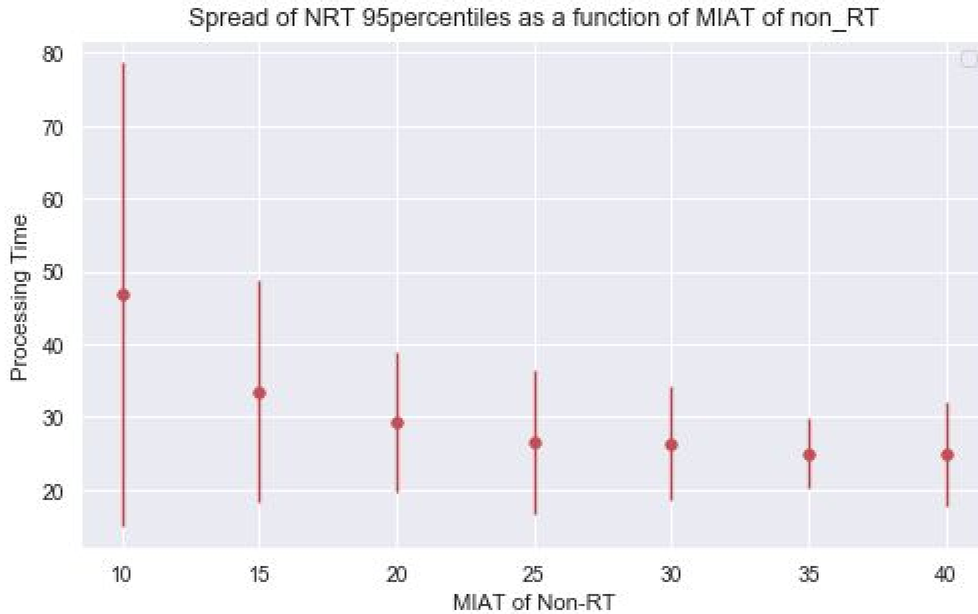


- Another observation that is worth noting is there seems to be no direct correlation between the RT Mean distribution and the RT 95th Percentile distribution graphs(discussed in the following results section). This is probably caused by the outlier values generated by the exponential distribution of values.

- The value of the processing time for non-RT messages starts out at over 15 and then steadily drops as NonRT Interval value increases. This can be explained by the indirect correlation since there is more time to process the RT messages and less non-RT messages are stuck in the queue waiting to be processed.



- The value of the 95th percentile of the non-RT messages looks similar to the distribution of the mean values of non-RT. It also starts out at a high value and drops as the non-RT Interval value increases for reasons stated in the previous point.



- In the case of the non-RT Mean distribution and the non-RT 95th Percentile, they are alike in shape, which is probably since the priority of the non-RT messages being so low(discussed in the following results section). Therefore, when the non-RT interval increases, it benefits the entire distribution as a whole and hence the entire distribution continues to look similar despite the randomness involved.

Individual Result Discussion:

Below are the results for the various iterations of values required by the assignment.

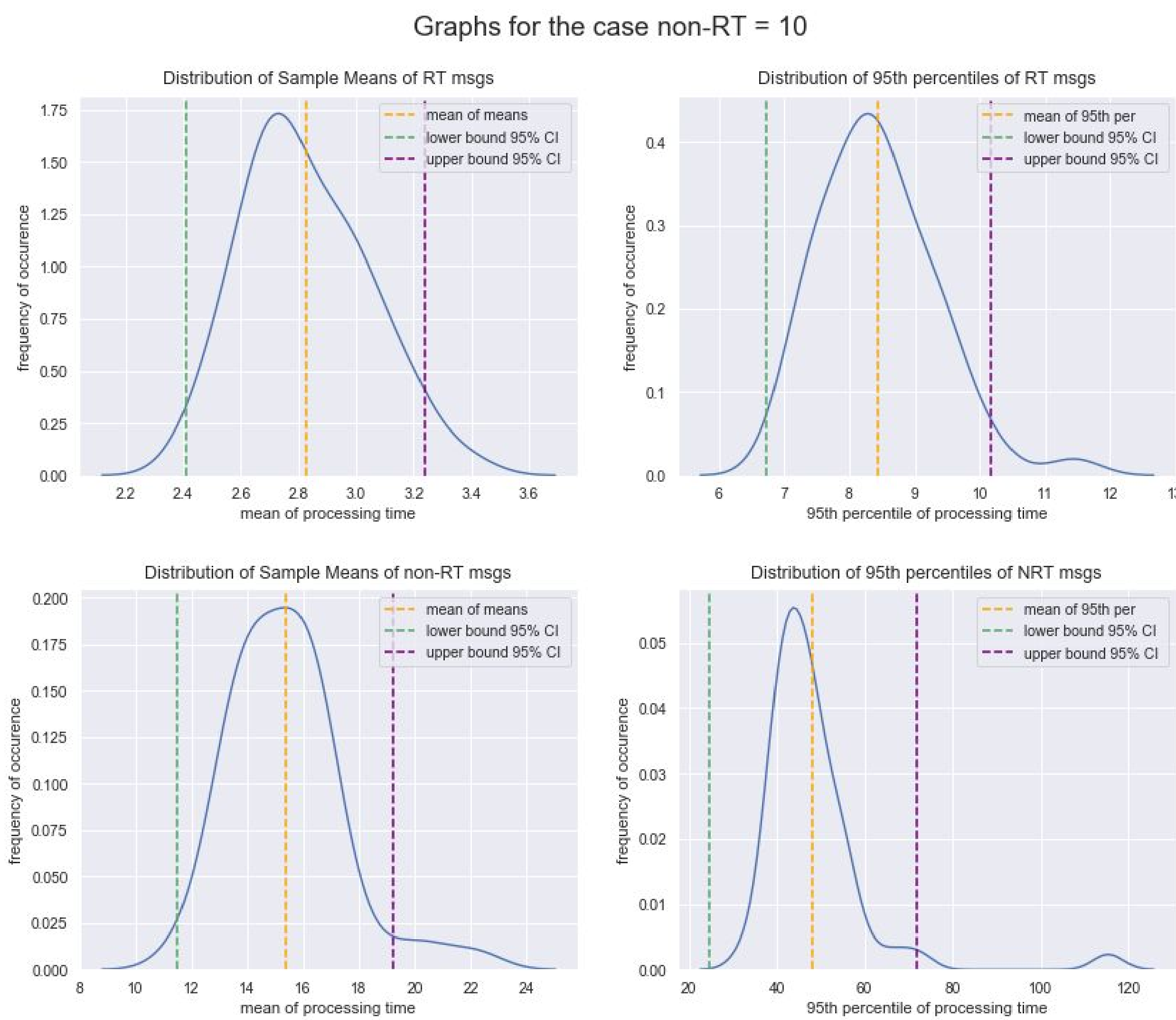
Given, rt_int = 7.0,

rts = 2.0

nonrts = 4.0

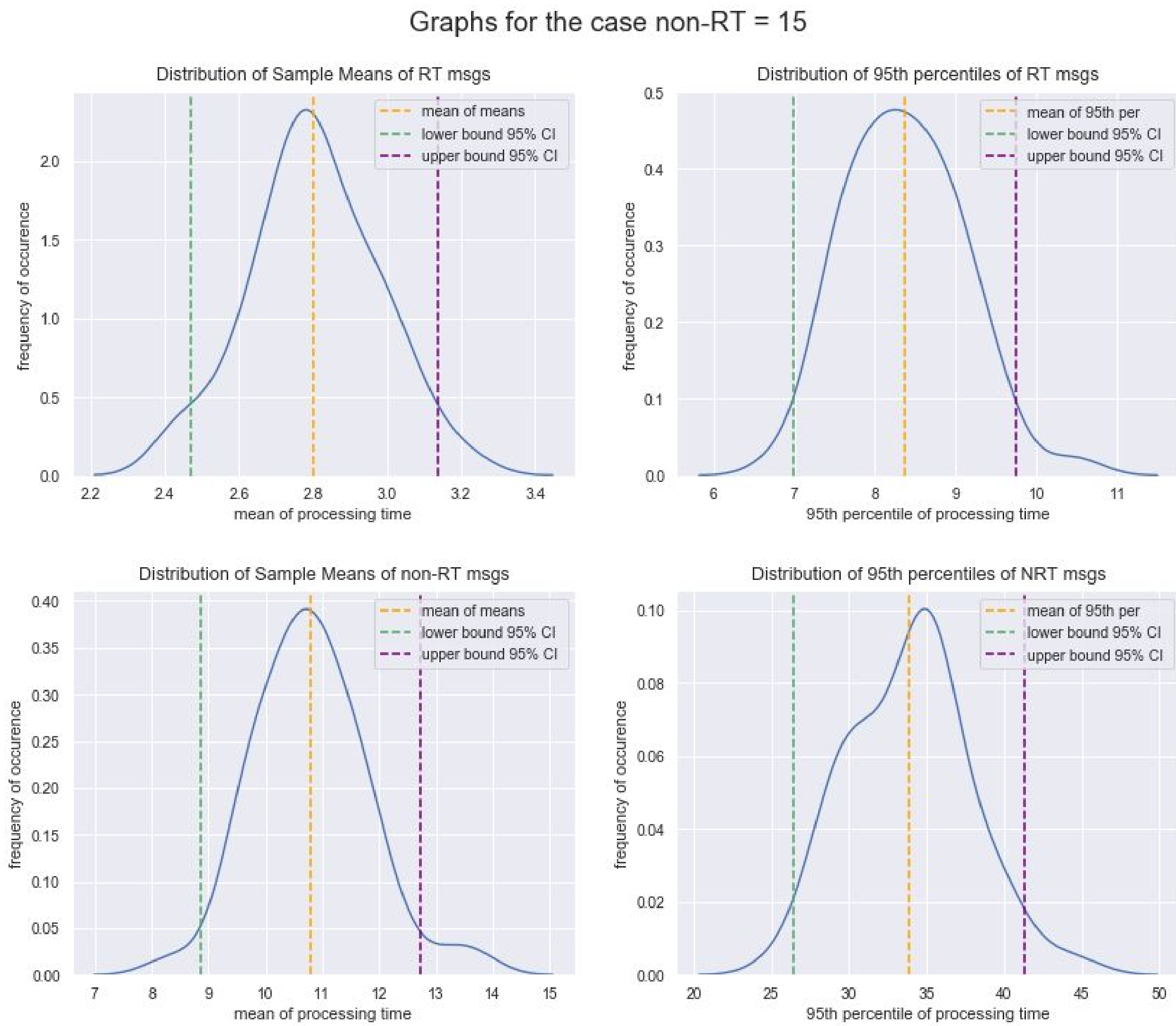
noOfBatches = 51

msgPerBatch = 1000



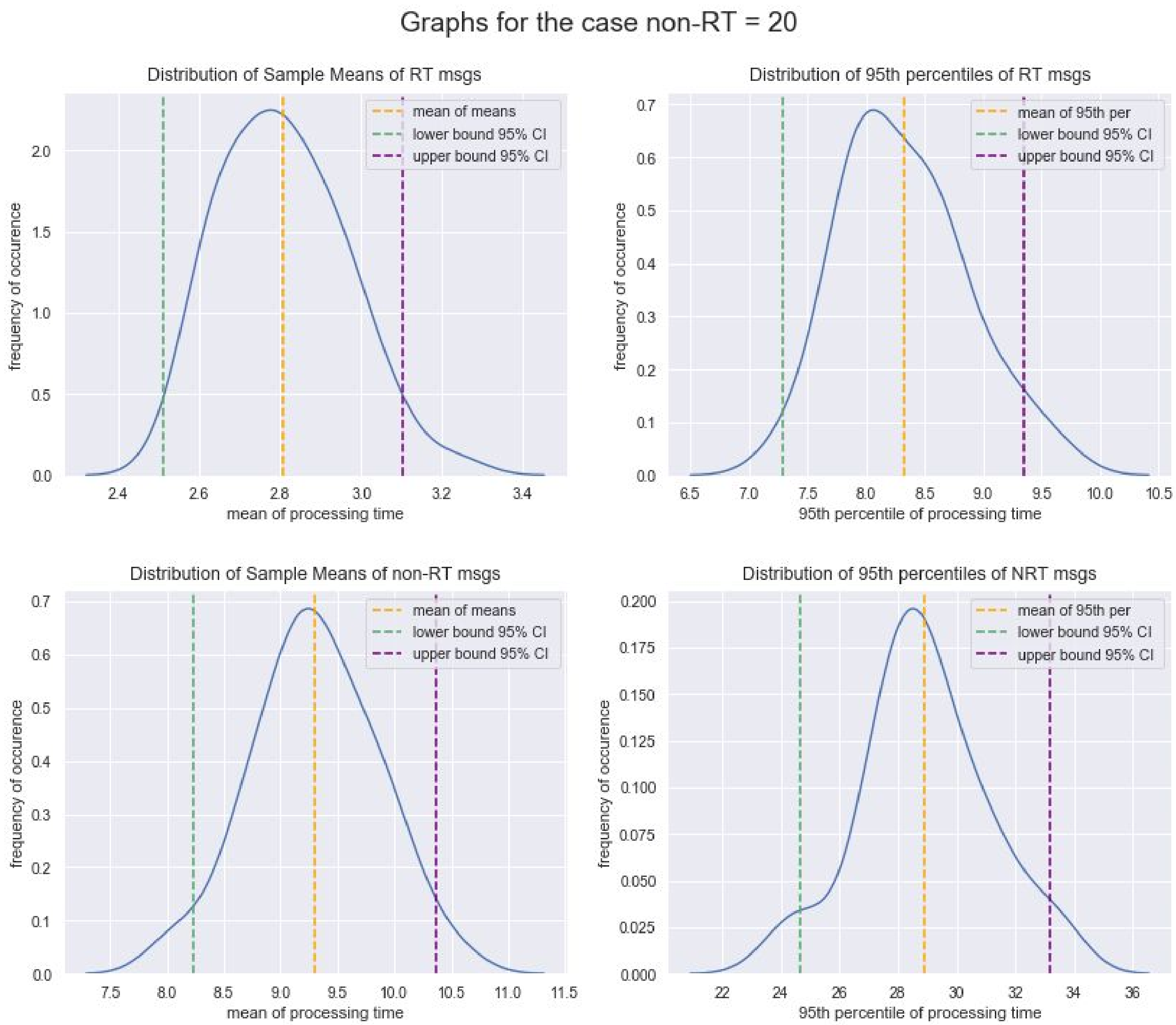
Graph 1 => Mean RT, Graph 2 => 95th Percentile RT
Graph 3 => Mean Non-RT Graph 4 => 95th Percentile Non-RT

- 1 and 2 are similar
- 3 and 4 also similar except the outlier
- Mean of 1 is ~2.8
- Mean of 2 is [8,9]
- Mean of 3 is [15,16]
- Mean of 4 is ~50



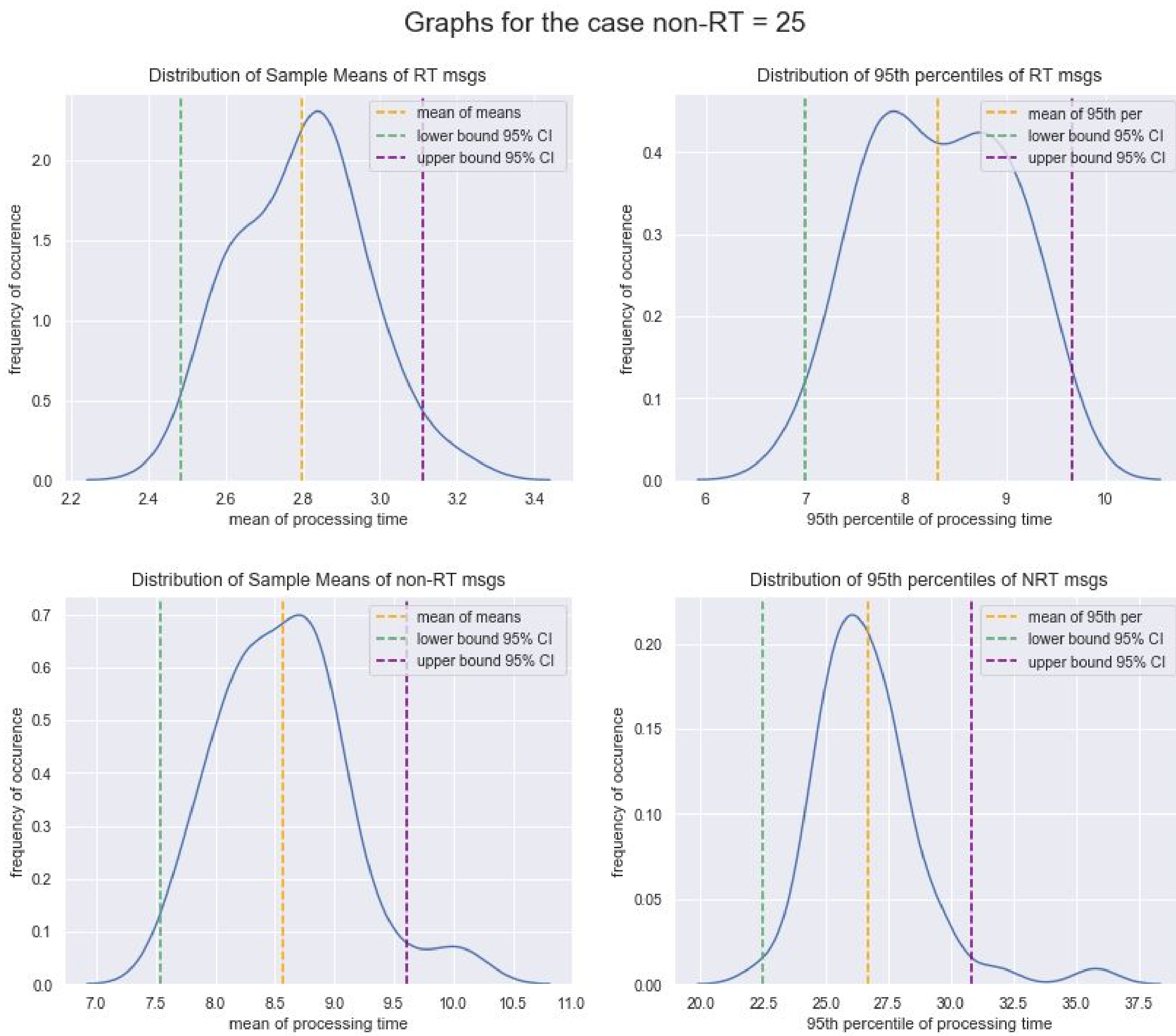
Graph 1 => Mean RT, Graph 2 => 95th Percentile RT
Graph 3 => Mean Non-RT Graph 4 => 95th Percentile Non-RT

- 1 has a narrow peak while 2 is much wider
- 3 has a single peak while 4 has two peaks
- Mean of 1 still constant at ~2.8
- Mean of 2 is still constant [8,9]
- Mean of 3 dropped to [10,11]
- Mean of 4 has dropped to ~35



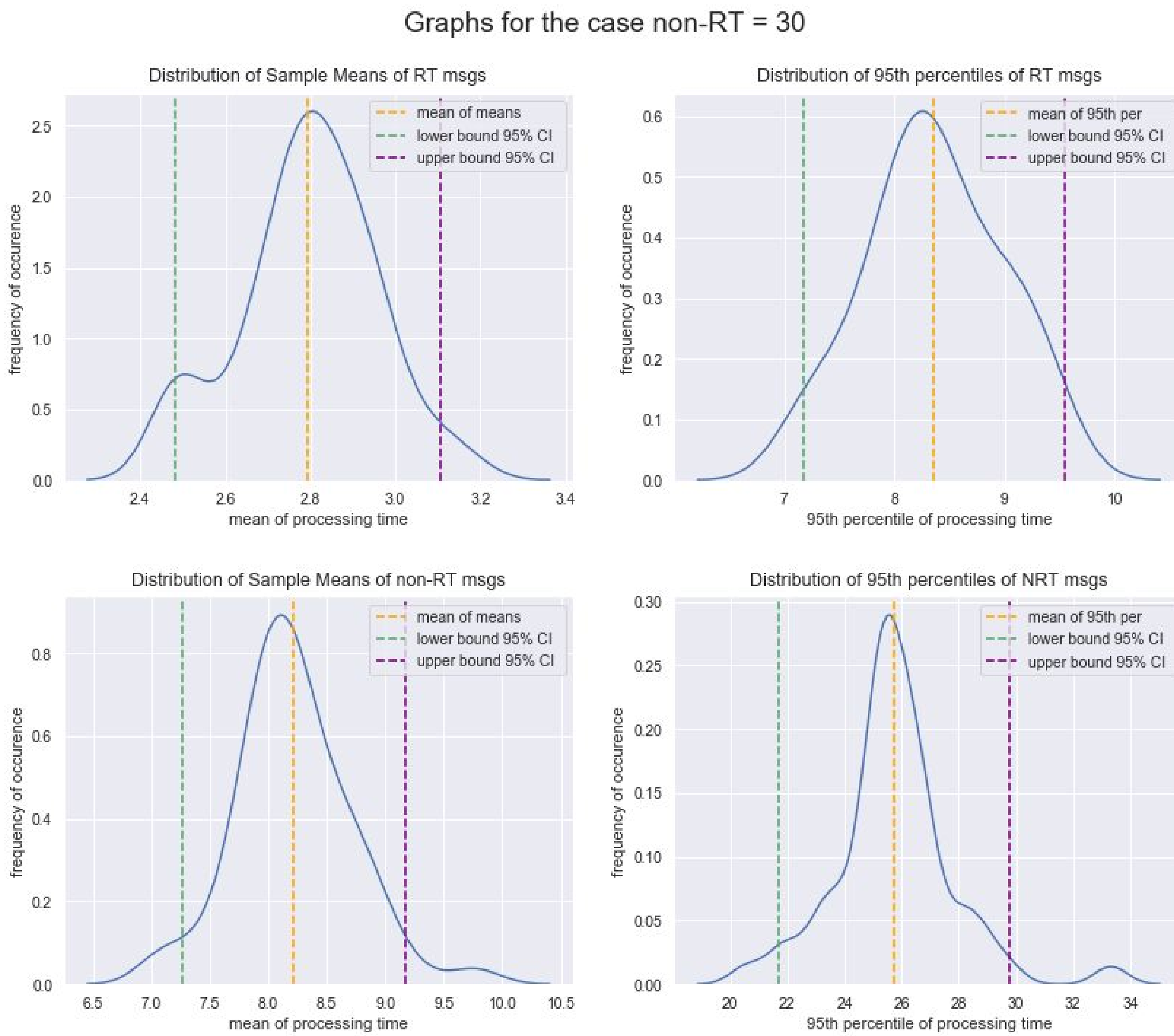
Graph 1 => Mean RT, Graph 2 => 95th Percentile RT
Graph 3 => Mean Non-RT Graph 4 => 95th Percentile Non-RT

- 1 has a single peak while 2 has a more dual peak plot
- 3 and 4 are fairly similar
- Mean of 1 still constant at ~2.8
- Mean of 2 is still constant [8,9]
- Mean of 3 dropped to [9,9.5]
- Mean of 4 has dropped to ~29



Graph 1 => Mean RT, Graph 2 => 95th Percentile RT
Graph 3 => Mean Non-RT Graph 4 => 95th Percentile Non-RT

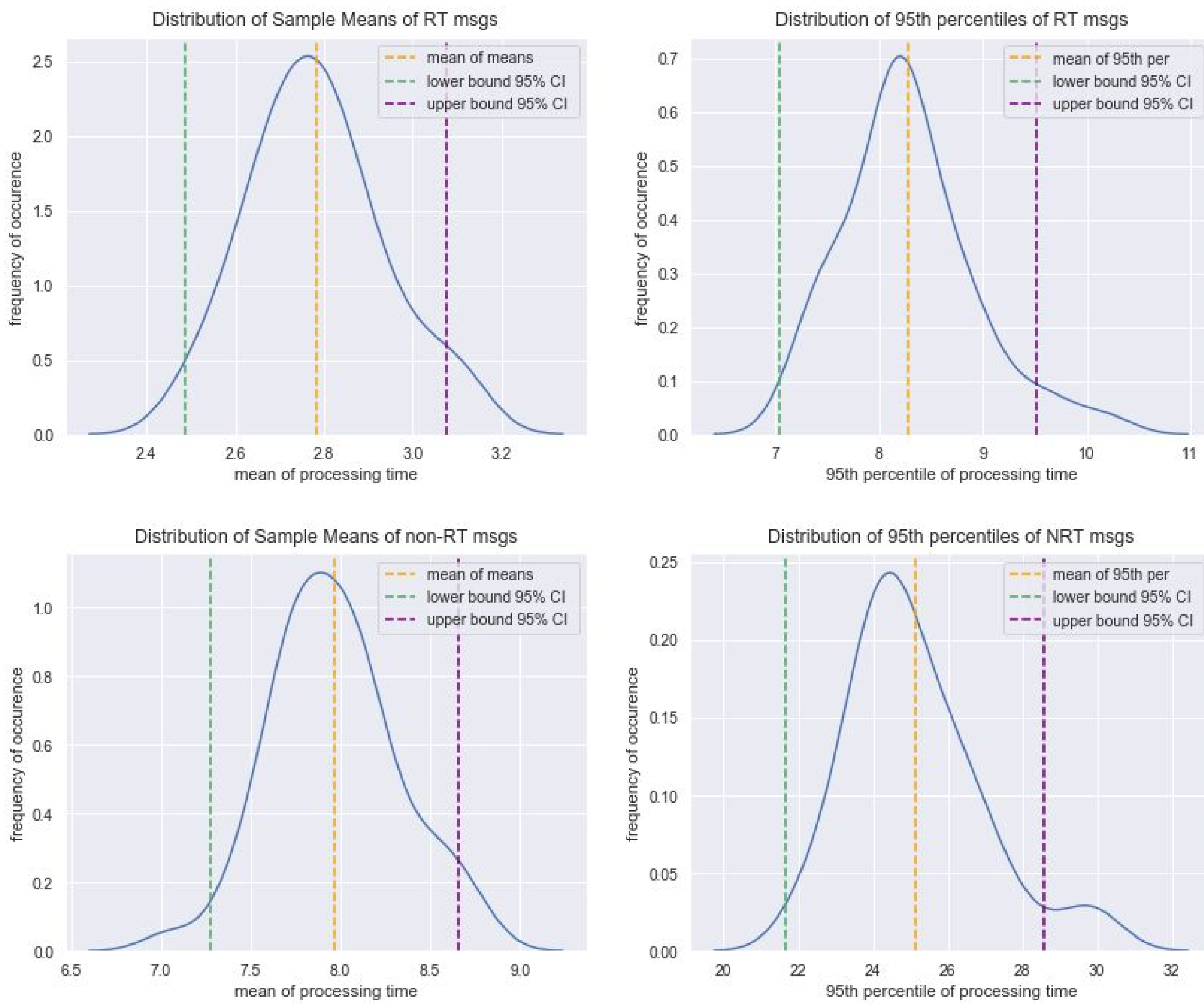
- 1 and 2 have two completely different dual peak plots
- 3 has a wider peak than 4
- Mean of 1 still constant at ~2.8
- Mean of 2 is still constant [8,9]
- Mean of 3 dropped to ~8.5
- Mean of 4 has dropped to ~27



Graph 1 => Mean RT, Graph 2 => 95th Percentile RT
Graph 3 => Mean Non-RT Graph 4 => 95th Percentile Non-RT

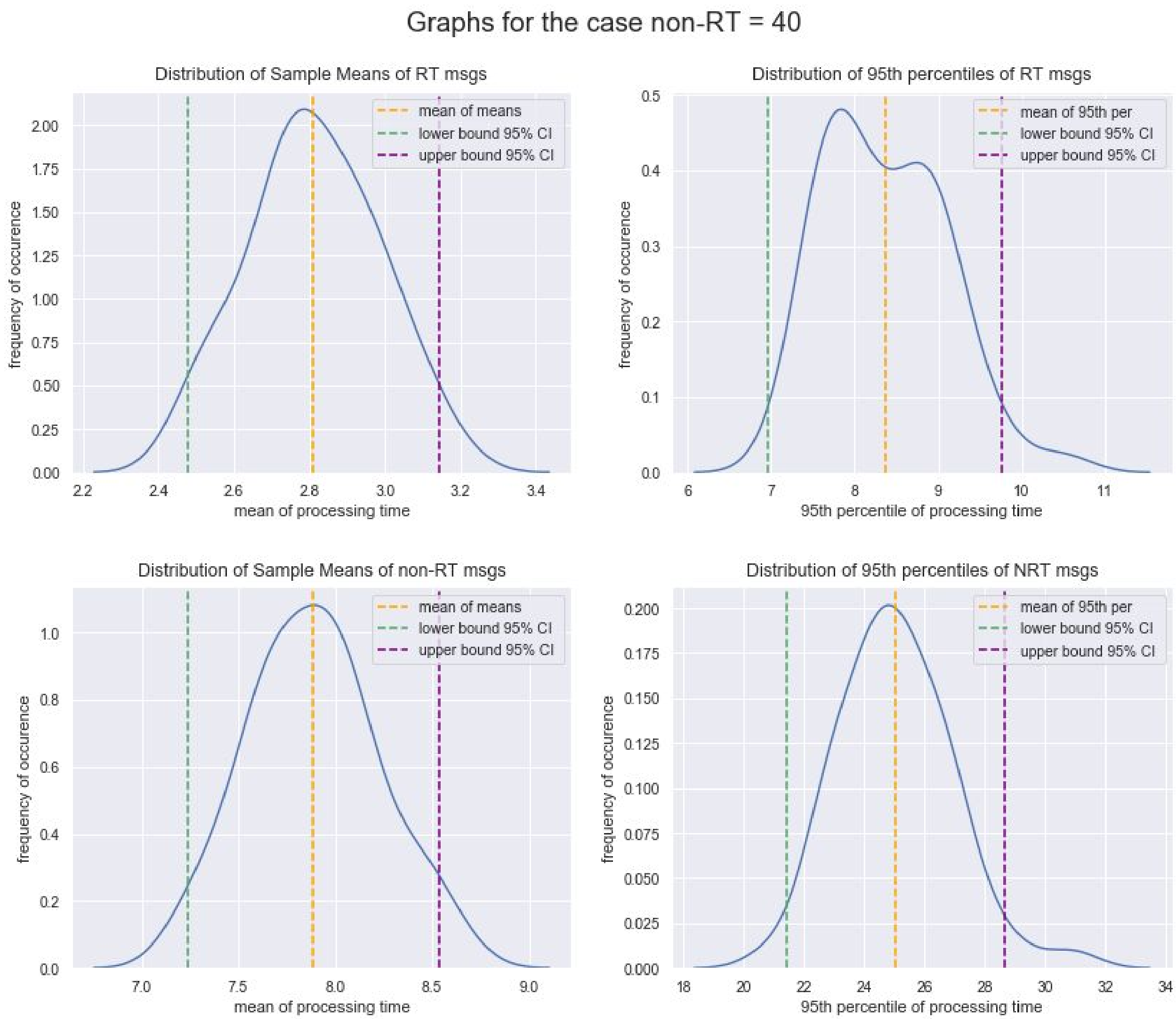
- 1 and 2 have two completely different plots
- 3 and 4 have similar plots
- Mean of 1 still constant at ~2.8
- Mean of 2 is still constant [8,9]
- Mean of 3 dropped to ~8.25
- Mean of 4 has dropped to ~26

Graphs for the case non-RT = 35



Graph 1 => Mean RT, Graph 2 => 95th Percentile RT
Graph 3 => Mean Non-RT Graph 4 => 95th Percentile Non-RT

- 1 and 2 have similar plots
- 3 and 4 have similar plots, but 4 has a more pronounced second peak
- Mean of 1 still constant at ~2.8
- Mean of 2 is still constant [8,9]
- Mean of 3 dropped to ~8
- Mean of 4 has dropped to ~25



Graph 1 => Mean RT, Graph 2 => 95th Percentile RT
Graph 3 => Mean Non-RT Graph 4 => 95th Percentile Non-RT

- 1 and 2 have two completely different plots
- 3 and 4 have similar plots
- Mean of 1 still constant at ~2.8
- Mean of 2 is still constant [8,9]
- Mean of 3 dropped to [7.5,8)
- Mean of 4 has stayed around ~25