IE 306.02 Spring 2020 Assignment 2

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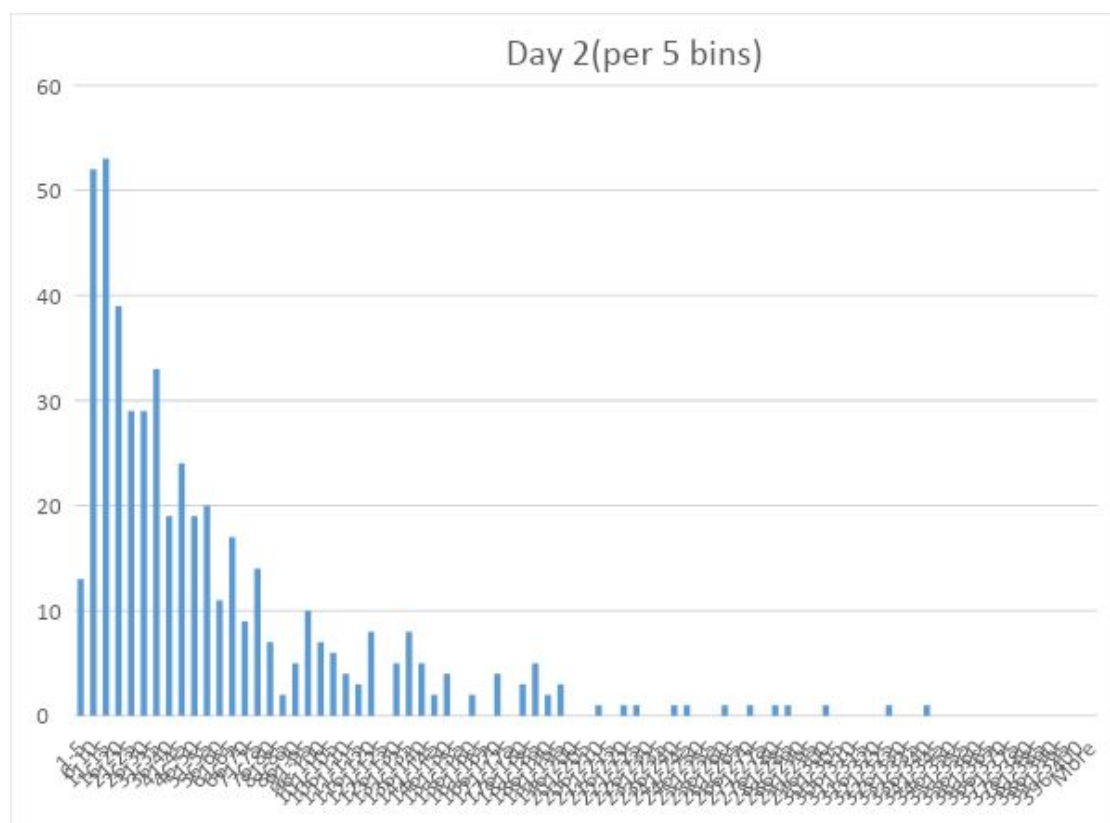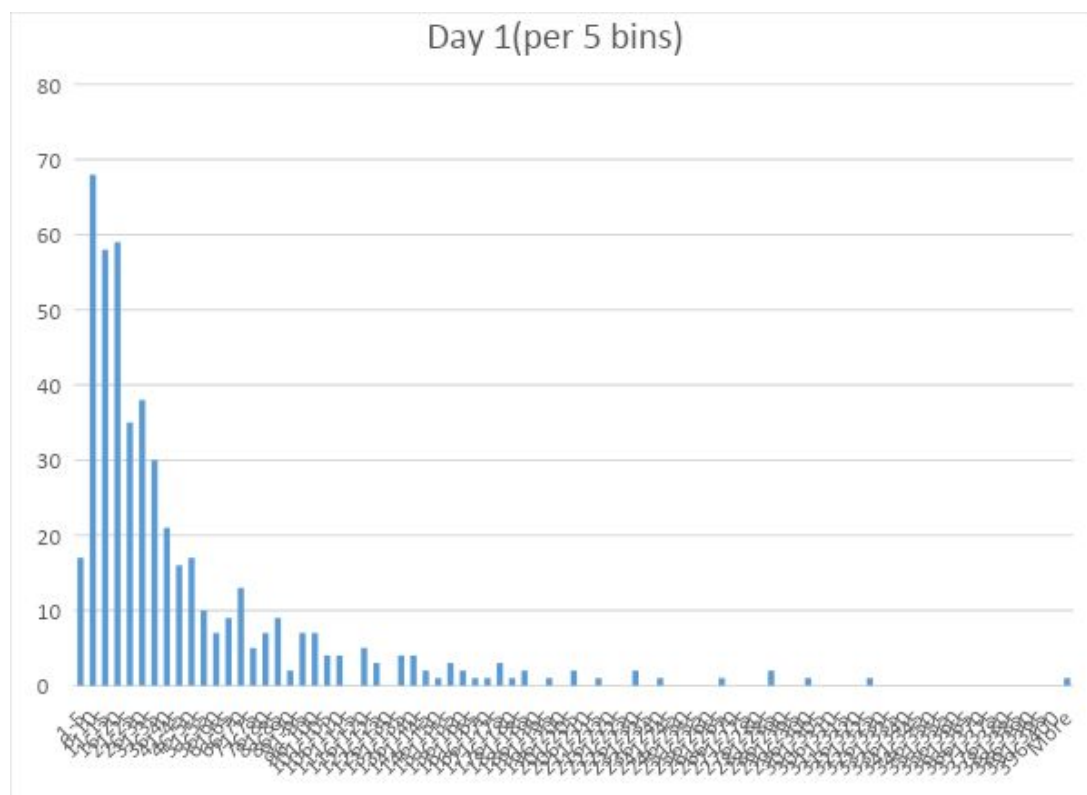
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Question 1

We are asked to test if the interarrival times distributed uniformly between 0 and 400. For our test method, we have been asked to use KS test with a significance level of 0.05. In order to do so, we checked several sources for the exact method. While some of these weren't resorted to sorting first, we resorted a method which does sorting. Then we compute I/N and R_i for both. After that we compute I/N - R_i and R_i-((I-1)/N). If the these are negative we don't take them into account. We call biggest one of these "D". We find out that the D Values are 0.68897996 for Day 1 and 0.64298725 for Day 2 respectively. We'll look into $D_{0.05}$ with N = 488 which is the number of the samples and test this claim. And the values we'll get is 0.0614783 and 0, 061541385. Since our test values are higher, we can safely REJECT and say the claim is false.
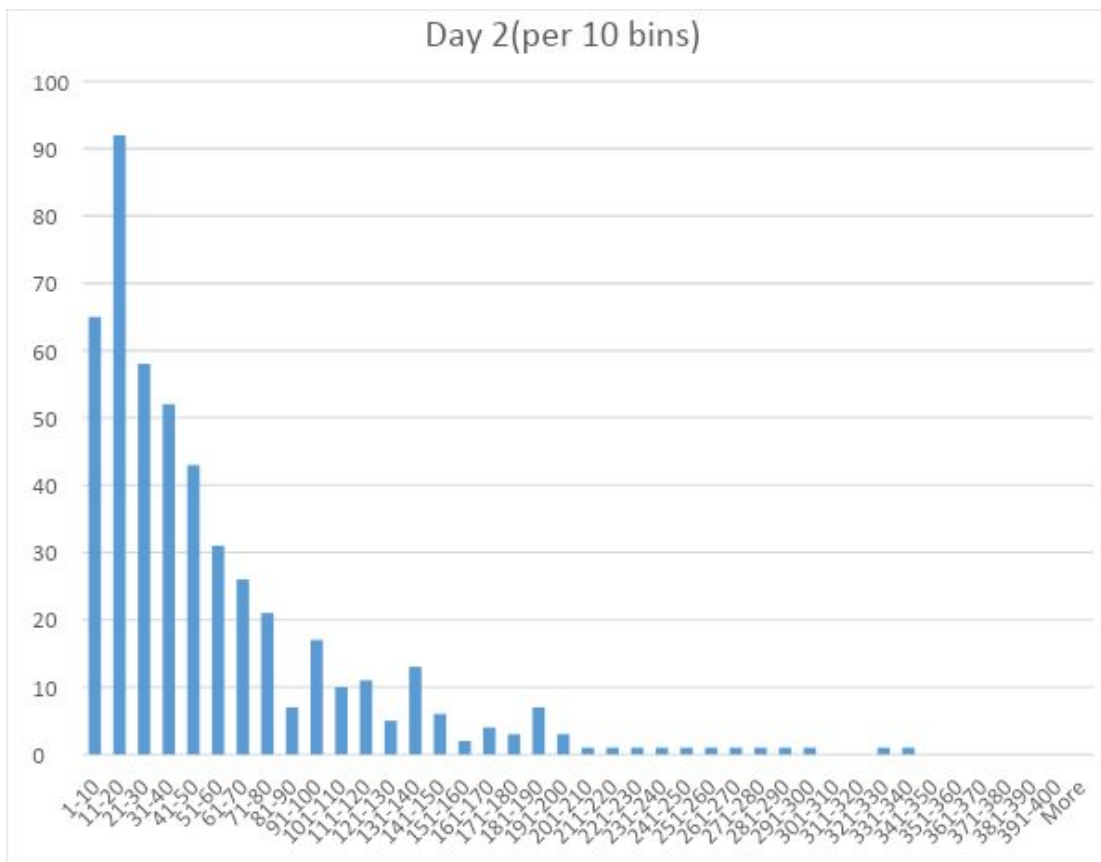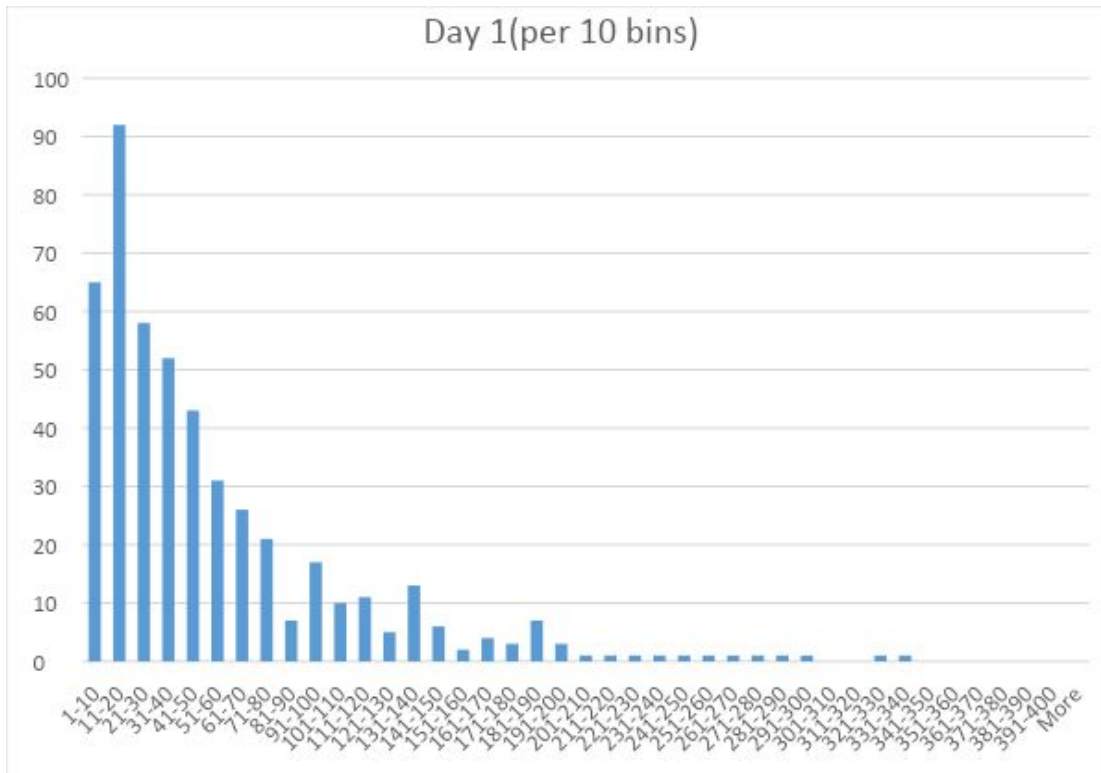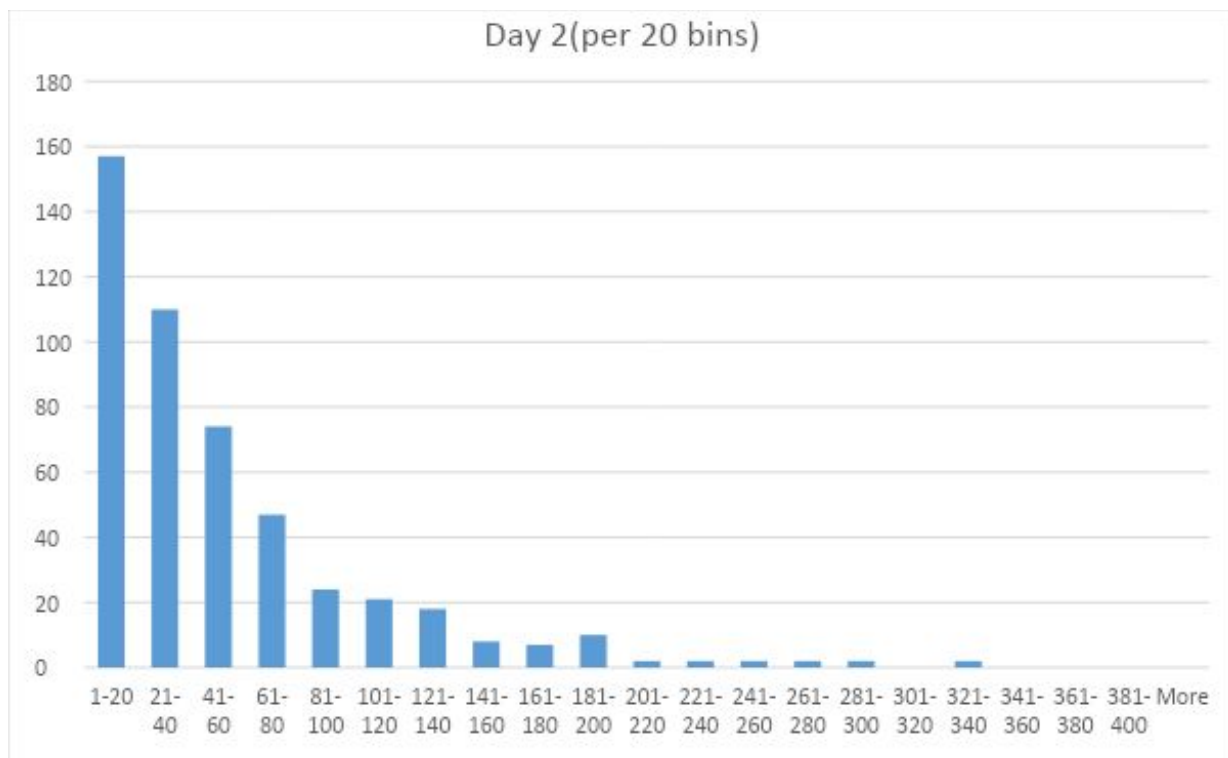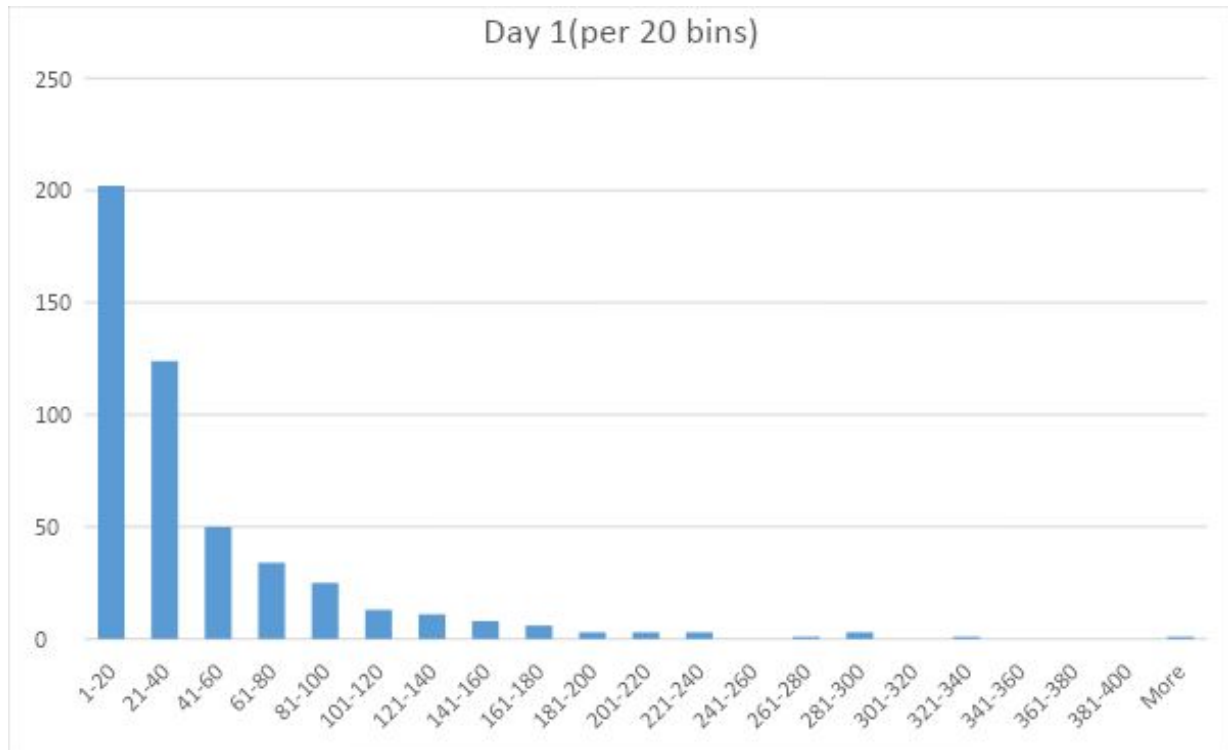
Question 2

	Day 1	Day 2
Mean	45	54
		55.084090
STD	52.812353	1
	2789.1446	3034.2569
Variance	3	8
Max	434	339
	1.2222222	
Min	2	0
	10.222222	
Mod	2	20
Median	26	35

Question 3

3.1

Day 1(per 5 bins)

Day 2(per 5 bins)

Day 1(per 10 bins)

Day 2(per 10 bins)

Day 1(per 20 bins)

Day 2(per 20 bins)

3.2

After some discussions between our group, we decided that these are exponential distributions.

Question 4

| Chi-Square(0.05,80)	101.879	
	day1	day2
chi value	322.9678	210.3576
	REJECT	REJECT

	Day 1	Day 2
Mean	45	54
Lambda/Rate	0.022222	0.018519

We were asked to check if chi-square test at a significance level of 0.05 with 10 second intervals to test whether the data comes from an exponential distribution and with the results we can say they're not.

Question 5

5.1

Z value(day 1)

$y = 0.811x + 8.1765$
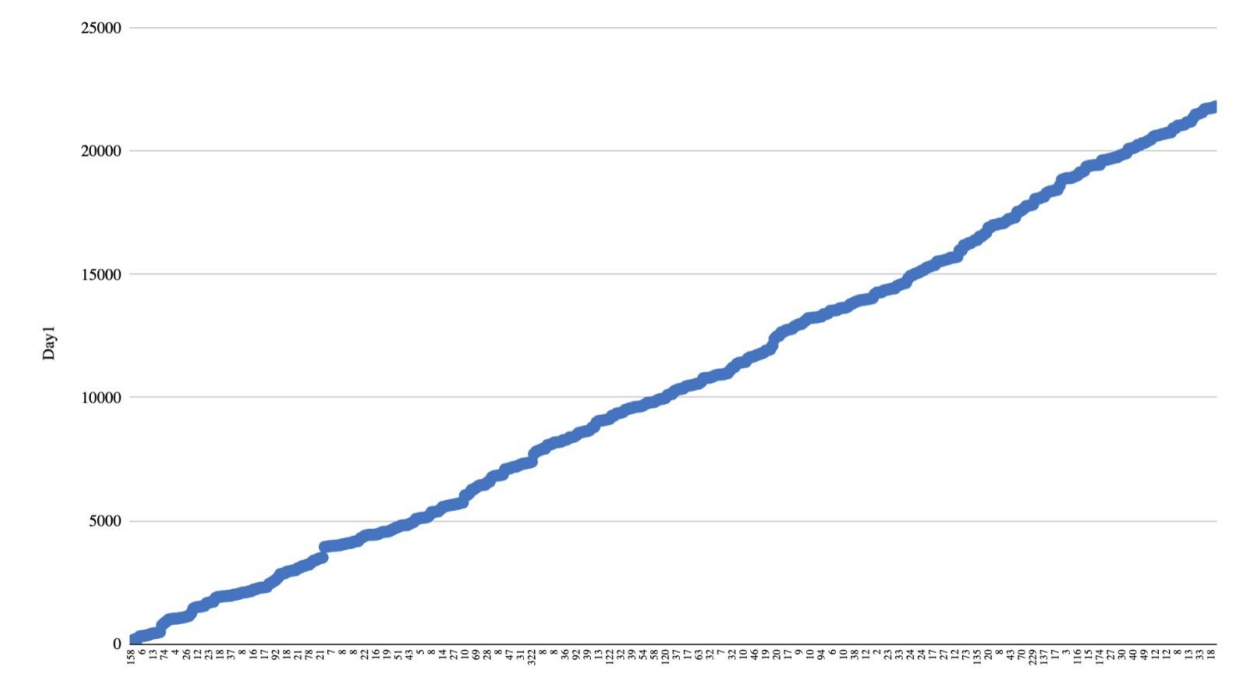

Z value(day2)

$y = 0.9493x + 2.3929$
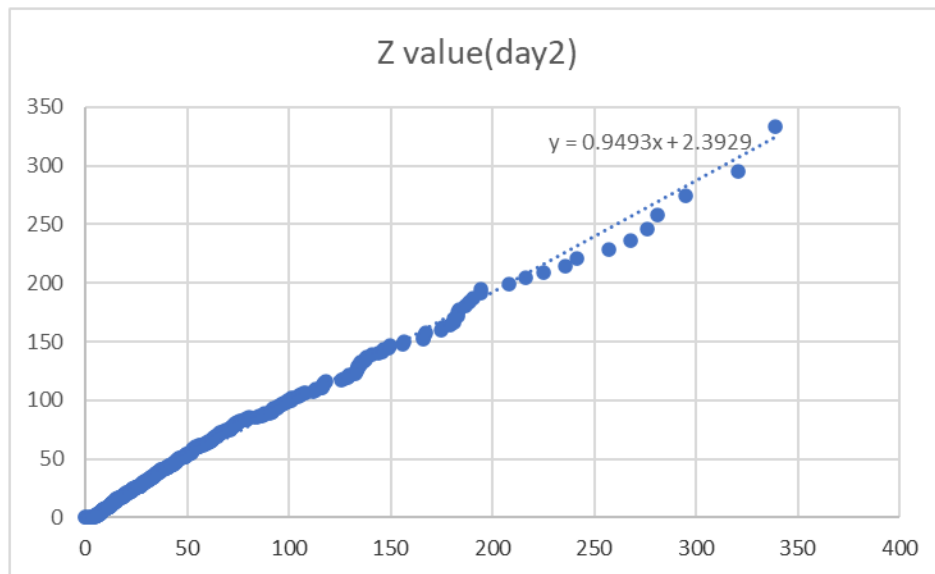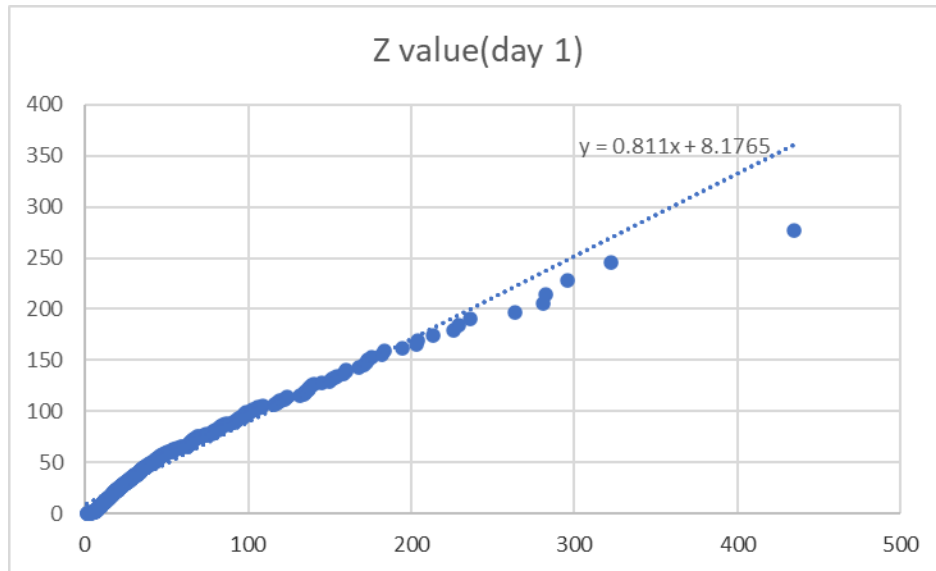
5.2

Our distribution is not steeper than exponential distribution, but still very alike. So we can easily say that our distribution can be called exponential distribution. Our QQ test is "FAIL TO REJECT" and we can say that "Our distribution is exponentially distributed.
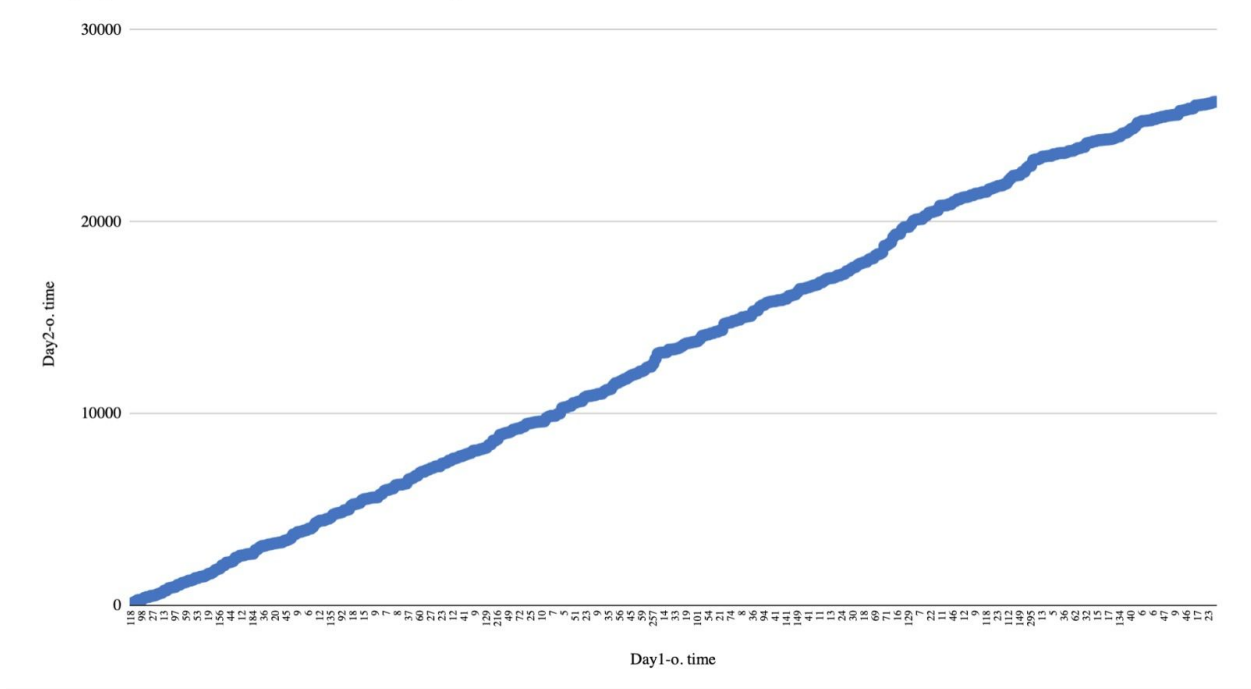
Question 6

6.1

Day1(observation & interarrival times)

Day2(observation & interarrival times)

6.2

We can see that inter-arrival times are looking like exponential distribution. Since Y axis doesn't change the interarrival times, we can say that the data points are transfixed.
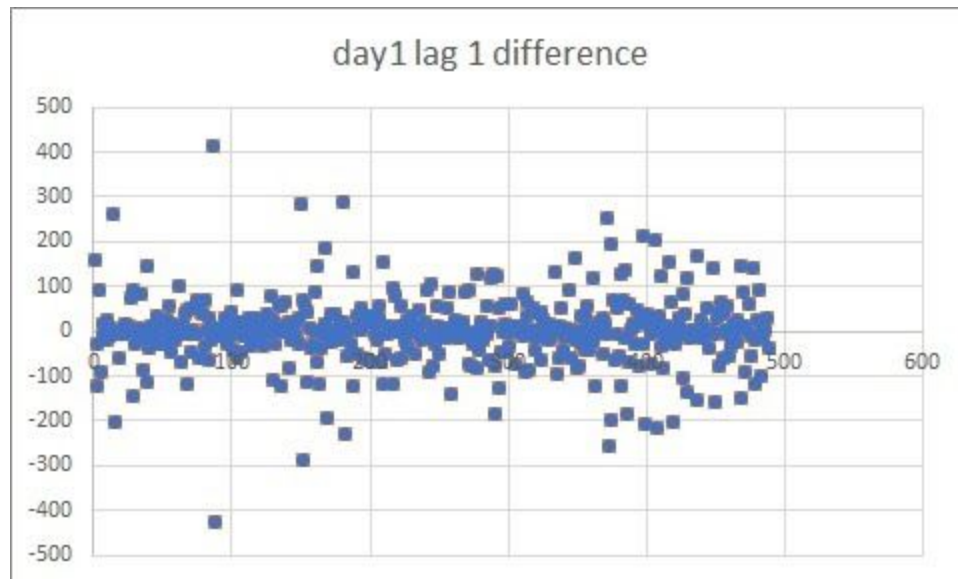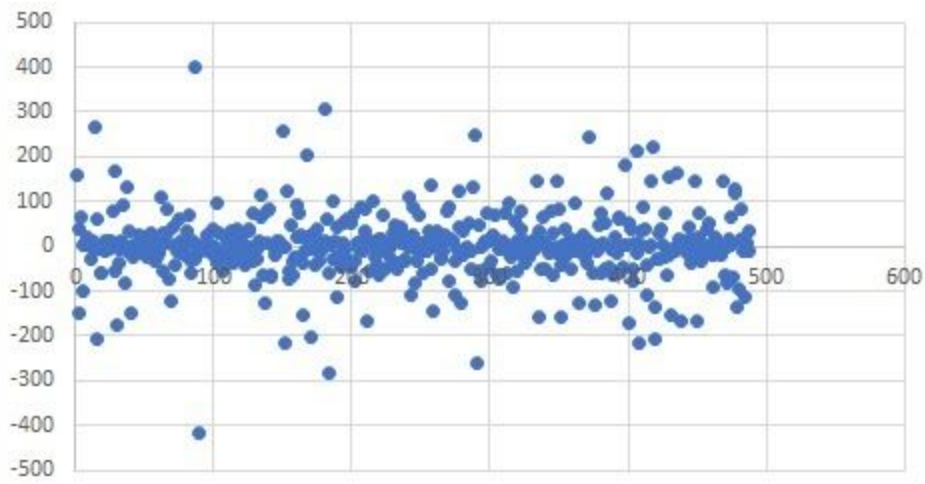
Question 7

7.1

7.2

		Day 1	Day 2
Mean		44,73235428	53,77094718
Number of data points		488	488
Lag		AutoCorrelation	
	1	0,002461331	-0,016648255
	2	-0,015860304	-0,009296031

We can see that there is no auto-correlation.

day1 lag 1 difference

day 1 lag 2 difference

day 2 lag 1 difference

day 2 lag 2 difference