

IE 324 Simulation

Fall 2017

Study Set 1

1. A robot is used to change the tires of cars in a formula race. It was thought that the changing times followed a normal distribution. A sample of 50 changing times was automatically taken by the robot, with the following results, where the values are in seconds:

11.75342	105.979	24.20534	19.96557	47.25537
5.675522	1.712097	191.1394	197.7346	55.26586
118.3722	2.511075	9.380872	73.65115	15.32683
5.197264	41.46165	3.916889	176.4047	13.14472
26.28795	12.77941	22.22839	133.7455	96.21154
133.5047	112.0085	15.91251	11.14178	40.94534
73.32579	49.51979	17.02909	20.88421	46.36779
34.61809	5.049268	53.68405	65.88024	25.036
2.49071	13.36099	24.22833	2.928778	19.69658
2.050201	2.371885	101.2404	193.2091	16.14412

- Compute the sample mean and sample variance.
- Using the Q – Q plot of the changing times, decide whether the data is from a normal distribution.
- If the data is not from a normal distribution, propose a distribution and check it with its Q – Q plot.

2. The time required for 50 different employees to compute and record the number of hours worked during the week was measured, with the following results in minutes:

Employee	Time (Minutes)	Employee	Time (Minutes)
1	2.293511	26	0.760443
2	0.557467	27	1.680263
3	0.402937	28	0.361175
4	0.560191	29	1.089141
5	1.02743	30	1.812602
6	0.778244	31	0.108883
7	1.569043	32	0.229146
8	0.380271	33	1.033766
9	2.149458	34	0.820109
10	0.484715	35	0.921492
11	2.187169	36	2.718621
12	1.28788	37	2.075701
13	0.605029	38	1.302794
14	0.320139	39	2.538872
15	3.240163	40	0.29278
16	0.094468	41	2.83022
17	0.327625	42	2.57349
18	0.928696	43	3.058295
19	1.071264	44	2.560198
20	1.039328	45	1.437292
21	1.526107	46	2.020006
22	0.872392	47	0.137907
23	0.866664	48	1.459234
24	0.259739	49	2.92092
25	0.296217	50	0.172917

Use the chi-square test to test the hypothesis that these service times are exponentially distributed. Let the number of class intervals be $k=7$. Use the level of significance $\alpha = 0.05$.

3. Records pertaining to the monthly number of job-related injuries at an underground coalmine were being studied by a federal agency. The values for the past 100 months were as follows:

<u>Injuries per Month</u>	<u>Frequency of Occurance</u>
0	24
1	13
2	24
3	16
4	8
5	6
6	4
7	1
8	4

- Apply the chi-square test to these data to test the hypothesis that the underlying distribution is Poisson. Use the level of significance $\alpha = 0.05$.
- Apply the chi-square test to these data to test the hypothesis that the underlying distribution is Poisson with mean 3.0. Use the level of significance $\alpha = 0.05$.
- What are the differences between parts (a) and (b), and when might each case arise?