CSC446 ASS4

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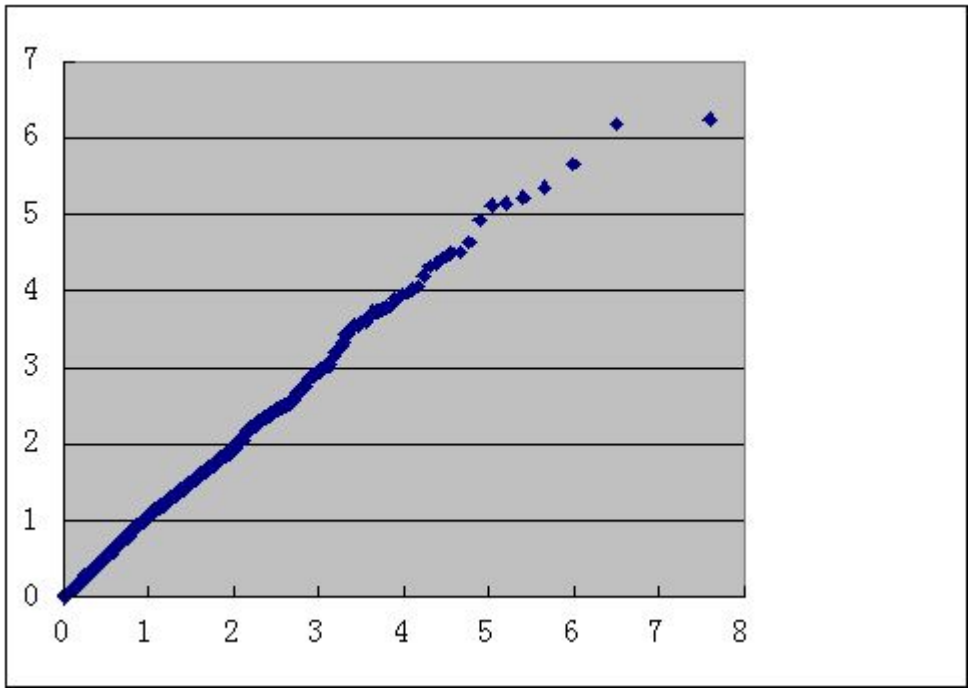
1.

A.



Since it is a straight line, it is a member of an appropriate family of distribution.

B.

Mean	1.012208063
Variance	0.943034803

C.

	count
Bin1	374
Bin2	234
Bin3	168
Bin4	93
Bin5	56
Bin6	28
Bin7	13
Bin8	17
Bin9	7
Bin10	3
Bin11	7
total	1000

xi	0i	Ei	
1	374	393.4693403	0.963366576
2	234	238.6512185	0.090650423
3	168	144.749281	3.734705479
4	93	87.79487691	0.308597806
5	56	53.25028461	0.141988625
6	28	32.29793026	0.571931524
7	13	19.58968495	2.216674122
8	17	11.88174453	2.204772115
9	7	7.20664235	0.005925237
10	3	4.371049539	0.110709668
11	7	6.737946999	
total	1000	1000	10.34932158

Degree=10-1-1=8

Since,X(0.05,8)=15.5>10.34, it is not rejected. Then it conforms to exponential distribution.

D.

X(0.1,8)=13.4>10.34 and X(0.01,8)=20.1>10.34, then the outcomes are same.

2.

A. Mean= 111/100=1.11;

xi	0i	Ei	
0	35	32.95589611	0.126786439
1	40	36.58104468	0.319544059
2	13	20.3024798	2.626586098
3	6	7.511917525	
4	4	2.084557113	
5	1	0.462771679	0.339240576
6	1	0.085612761	
total	100	99.98427966	3.412157172

Degree=4-1-1=2;

Since X0^2=3.4121<X(0.05,2)^2=5.99, the hypothesis is not rejected.

B. Mean=1;

xi	0i	Ei	

0	35	36.78794412	0.086896516
1	40	36.78794412	0.280453372
2	13	18.39397206	1.581764639
3	6	6.13132402	
4	4	1.532831005	
5	1	0.306566201	1.972863998
6	1	0.051094367	
total	100	99.99167589	3.921978525

Since X0^2=3.92198<X(0.05,2)^2=5.99, the hypothesis is not rejected.

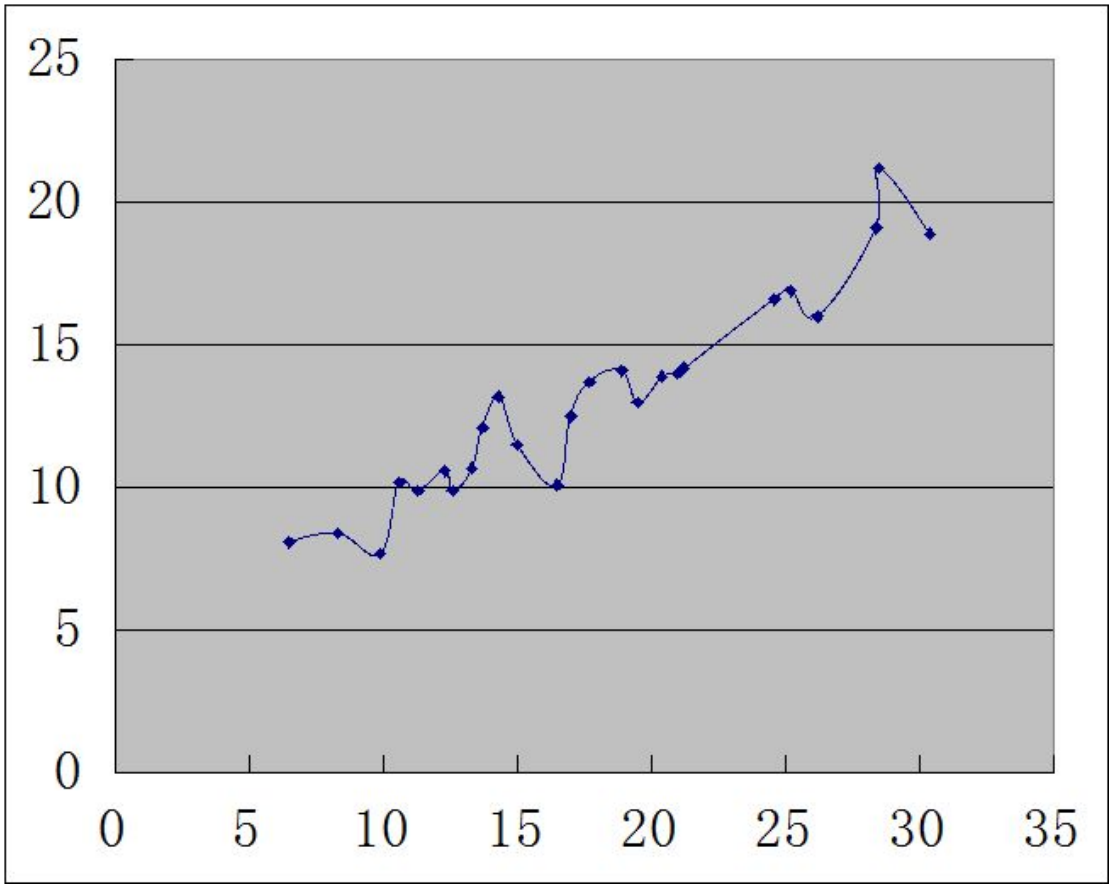
C.

The difference is mean of them, then the results of test statistic are different.

When mean is not given, then apply for (a), else apply for(b).

3.

A. After sorting by milling time, the graph is :



Thus, these data seem dependent, since planing time is constantly increasing when milling time is increasing.

B.

Order	Milling	planing	X1*X2
1	6.5	8.1	52.65
2	8.3	8.4	69.72
3	9.9	7.7	76.23
4	10.6	10.2	108.12
5	11.3	9.9	111.87
6	12.3	10.6	130.38
7	12.6	9.9	124.74
8	13.3	10.7	142.31
9	13.7	12.1	165.77
10	14.3	13.2	188.76
11	15	11.5	172.5
12	16.5	10.1	166.65
13	17	12.5	212.5
14	17.7	13.7	242.49
15	18.9	14.1	266.49
16	19.5	13	253.5
17	20.4	13.9	283.56
18	21	14	294
19	21.2	14.2	301.04
20	24.6	16.6	408.36
21	25.2	16.9	425.88
22	26.2	16	419.2
23	28.4	19.1	542.44
24	28.5	21.2	604.2
25	30.4	18.9	574.56
Ex	17.732	13.06	6337.92
STDev	6.711105224	3.561483773	
COV=	22.85091667		
Corr=	0.956045603		

C.

Step1:Generate Z1 and Z2 , two independent standard normal random variables

$$Z_1 = (-2\ln R)^{1/2}\cos(2\pi R_2)$$

$$Z_2 = (-2\ln R)^{1/2}\sin(2\pi R_2)$$

Step2: Set $X_1 = \mu_1 + \sigma_1 Z_1$

Step3: Set $X_2 = \mu_2 + \sigma_2(\rho Z_1 + Z_2\sqrt{1-\rho^2})$

4.

A. AR(1)

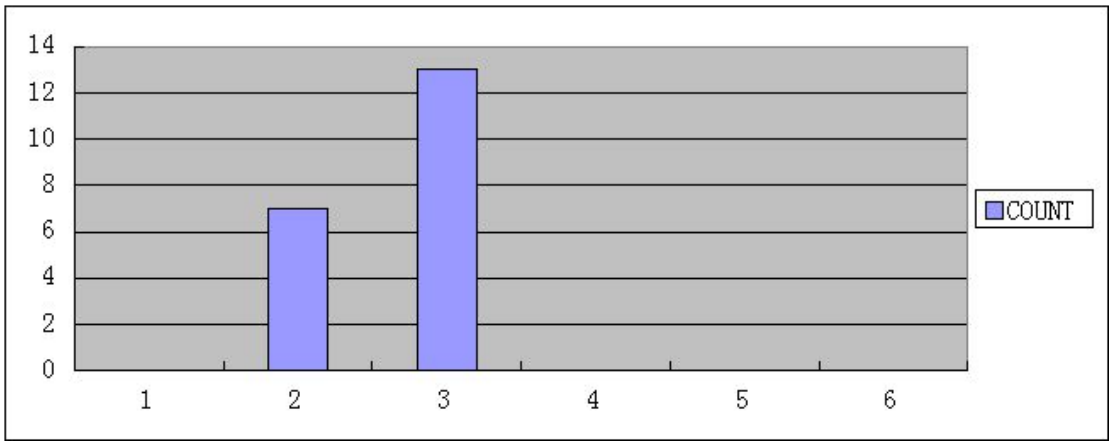
num	data	xixj	Generate		
1	20		14.1648894		
2	14	280	13.5322367	average=	20.05
3	21	294	17.50444469	Std^2=	15.41842105
4	19	399	14.66913931	cov=	6.418552632
5	14	266	14.38441174	p=	0.416291176
6	18	252	23.77688316	stde^2=	12.74643423
7	21	378	24.35010497	STDE=	3.570214872
8	25	525	20.18267637	std=	3.926629732
9	27	675	22.07286603		
10	26	702	20.88703992		
11	22	572	22.86368766		
12	18	396	21.50832581		
13	13	234	20.76214401		
14	18	234	20.83118615		
15	18	324	22.87361109		
16	18	324	22.54022629		
17	25	450	19.24765541		
18	23	575	20.88618246		
19	20	460	21.90282613		
20	21	420	21.75338171		
total	401	7760	400.693919		

B. EAR(1)

num	data	xixj	Generate				
1	20		7.694400077				
2	14	280	30.8133572			average=	20.05
3	21	294	12.82732871			Std^2=	15.41842105
4	19	399	48.24056149			cov=	6.418552632
5	14	266	20.08212007			p=	0.416291176
6	18	252	34.49153419			stde^2=	12.74643423
7	21	378	14.35852133			STDE=	3.570214872
8	25	525	26.18282354			std=	3.926629732
9	27	675	26.70080826				
10	26	702	25.18524837				
11	22	572	10.48439666				
12	18	396	4.364561815				

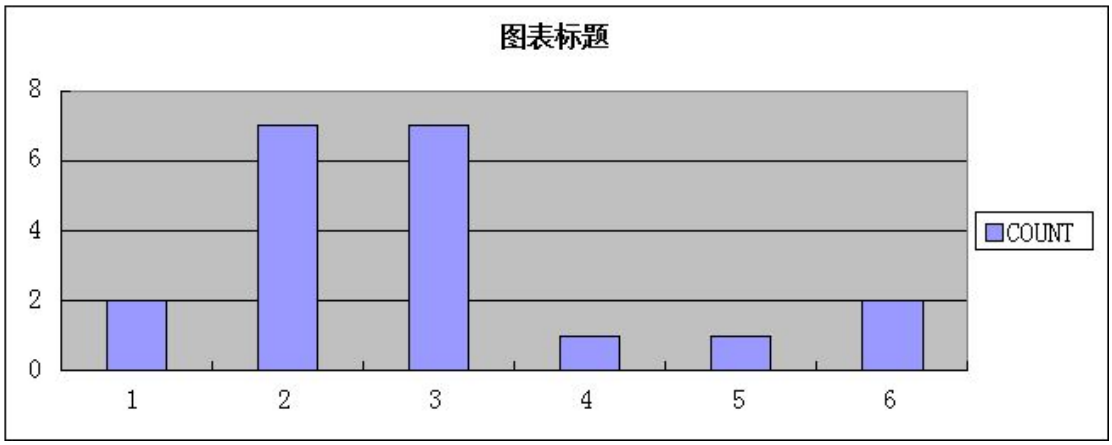
13	13	234	22.49532146				
14	18	234	25.62613888				
15	18	324	42.19823247				
16	18	324	17.56675182				
17	25	450	7.312883772				
18	23	575	39.03704432				
19	20	460	16.25077709				
20	21	420	53.04006493				
total	401	7760	484.9528765				

AR(1):



Bin1: 0-10, Bin2:10-20,Bin3: 20-30,Bin4:30-40, Bin5:40-50;Bin6: 50-60

EAR(1):



Bin1: 0-10, Bin2:10-20,Bin3: 20-30,Bin4:30-40, Bin5:40-50;Bin6: 50-60

Compared with these charts and source data, the AR(1) provides a better fit.

5.

A.

	Y(mins)	Y(hrs)

1	13350	222.5
2	16200	270
3	12000	200
4	14550	242.5
5	14150	235.8333333
6	16950	282.5
7	12300	205
8	14450	240.8333333
9	13550	225.8333333
10	15050	250.8333333
Avarage	14255	237.5833333
Std.s	1564.794981	26.07991635

Then point estimator=237.6hrs.

And t(0.025,9)=2.26, then a 95% confidence interval for the total delay is 237.58+ -

2.26(26.08)/$\sqrt{10}$ =237.58+ -18.64 hrs

PI=237.58+ - 61.82 hrs

B.

Actual total delay=5000*5/60=416.67hrs,

Then To=(416.67-237.58)/((26.08)/$\sqrt{10}$)=21.71>t(0.025,9)=2.26,then this model is inadequate.

CI=[218.94,256.22] based on a.

The worst case is 416.67-218.94=197.73 hrs

Then the worst case of average customer is 197.73hrs/5000*60mins/hr=2.37276mins>0.5mins,

Then additional replications are needed to reach a decision.

Then this data is not consistent with system behavior.

C.

	Average response time	Mean	Y(mins)	Y(hrs)
1	4.84	2	14200	236.6666667
2	4.96	2	14800	246.6666667
3	4.76	2	13800	230
4	4.8	2	14000	233.3333333
5	4.86	2	14300	238.3333333
6	4.97	2	14850	247.5
7	4.7	2	13500	225

8	4.95	2	14750	245.8333333
9	4.77	2	13850	230.8333333
10	4.96	2	14800	246.6666667
Avarage			14285	238.0833333
		STDV		8.231320042

Then point estimator=238.1hrs.

And t(0.025,9)=2.26, then a 95% confidence interval for the total delay is 238.1+ -

2.26(8.23)/$\sqrt{10}$ =237.58+ -5.88 hrs

PI=237.58+ -19.51 hrs

Actual total delay=5000*5/60=416.67hrs,

Then To=(416.67-238.1)/((8.23)/$\sqrt{10}$)=68.40>t(0.025,9)=2.26,then this model is inadequate.

CI=[231.7,243.46] based on a.
The worst case is 416.67-231.7=184.97 hrs
Then the worst case of average customer is 184.97hrs/5000*60mins/hr=2.22mins>0.5mins,
Then additional replications are needed to reach a decision.
Then this data is not consistent with system behavior.