PGDM(IBM), 2013-15
Quantitative Techniques
INS-107
Trimester – I , End-Term Examination: September 2013

Time allowed: 2 hrs 30 min | Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means.** In case of rough work please use answer sheet.

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Sections	No. of Questions to attempt	Marks	Marks
A	3 out of 5 (Short Questions)	5 Marks each	3*5 = 15
B	2 out of 3 (Long Questions)	10 Marks each	2*10 = 20
C	Compulsory Case Study	15 Marks	15
		Total Marks	**50**

Section- A

Q1.
What is Type 1 and type 2 errors? Explain with example.

Q2.
What is regression analysis and what is estimating equation in regression analysis?

Q3.
Develop the estimating equation that best describes the data.

X	13	16	14	11	17	9	13	17	18	12
Y	6.2	8.6	7.2	4.5	9.0	3.5	6.5	9.3	9.5	5.7

Q4.

Which probability distribution is most likely the appropriate one to use for following variables: binomial, poisson, or normal?
(a) The life span of a female born in 1977.
(b) The number of autos passing through a tollbooth.
(c) The number of defective radios in a lot of 100
(d) The water level in a reservoir.
(e) Passing or failing to pass an interview.

Q5

Why do we use Analysis of Variance (ANOVA)? Give a practical example where it can be applied?

Section-B

Q6.

Mike Godfrey, the auditor of a state public school system, has reviewed the inventory records to determine whether the current inventory holding of textbooks are typical. The following inventory amounts are from the previous 5 years.

Year	1991	1992	1993	1994	1995
Inventory (X $ 1,000)	4,620	4,910	5,490	5,730	5,990

(a) Find the Linear Equation that describes the trend in these data.
(b) Estimate the value of the inventory for the year 1996.

Q7.

(a) What is the central Limit Theorem?
(b) What is the sampling distribution?

Q8.

An advertising firm is trying to determine the demographics for a new product. They have randomly selected 75 people in each of 5 different age groups and introduced the product to them. The results of the survey are given below:

	Age Group				
	18-29	30-39	40-49	50-59	60-69
Purchase frequently	12	18	17	22	32
Seldom Purchase	18	25	29	24	30
Never pruchase	45	32	29	29	13

(a)Calculate the sample Chi square value
(b) At ά =0.01, test the null hypothesis.

Section- C

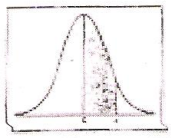
Q9.

(i)The data processing department at a large life insurance company has installed new color video display terminals to replace the monochrome units it previously used. The 95 operators trained to use the new machines averaged 7.2 hours before achieved a satisfactory level of performance. Their sample variance was 16.2 squared hours. Ling experience with operators on the old monochrome terminals showed that they averaged 8.1 hours on the machines before their performance were satisfactory. At a 0.01significance level, should the supervisor of the department conclude that the new terminals are easier to learn to operate (10 Marks)

(ii) Upon collecting a sample of 250 from a population with known standard deviation of 13.7, mean is found to be 112.4.
(a) Find a 95 percent confidence interval for the mean.
(b) Find a 99 percent confidence interval for the mean (5 Marks)

Table 5 Areas of a Standard Normal Distribution

The table entries represent the area under the standard normal curve from 0 to the specified value of z.



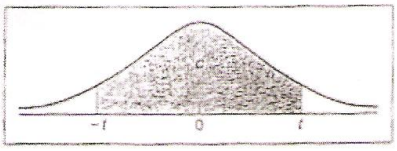
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998
3.6	.4998	.4998	.4998	.4999	.4999	.4999	.4999	.4999	.4999	.4999

For values of z greater than or equal to 3.70, use 0.4999 to approximate the shaded area under the standard normal curve.

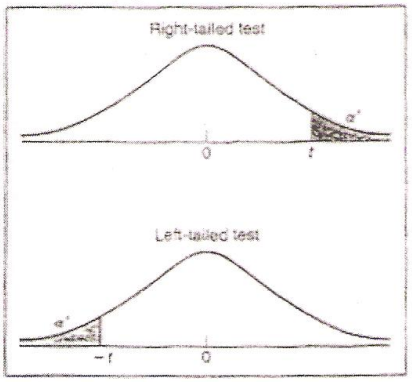
Table 6 Student's t Distribution

Student's t values generated by Minitab Version 9.2

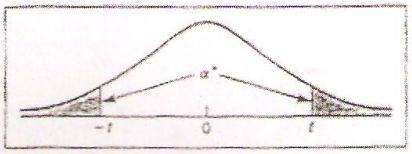
c is a confidence level:



a' is the level of significance for a one-tailed test:

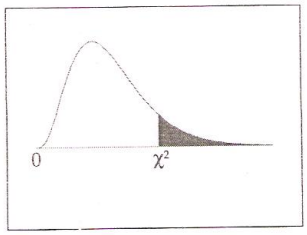


a'' is the level of significance for a two-tailed test



c	0.750	0.800	0.850	0.900	0.950	0.980	0.990
a'	0.125	0.100	0.075	0.050	0.025	0.010	0.005
a''	0.250	0.200	0.150	0.100	0.050	0.020	0.010
d.f.							
1	2.414	3.078	4.165	6.314	12.706	31.821	63.657
2	1.604	1.886	2.282	2.920	4.303	6.965	9.925
3	1.423	1.638	1.924	2.353	3.182	4.541	5.841
4	1.344	1.533	1.778	2.132	2.776	3.747	4.604
5	1.301	1.476	1.699	2.015	2.571	3.365	4.032
6	1.273	1.440	1.650	1.943	2.447	3.143	3.707
7	1.254	1.415	1.617	1.895	2.365	2.998	3.499
8	1.240	1.397	1.592	1.860	2.306	2.896	3.355
9	1.230	1.383	1.574	1.833	2.262	2.821	3.250
10	1.221	1.372	1.559	1.812	2.228	2.764	3.169
11	1.214	1.363	1.548	1.796	2.201	2.718	3.106
12	1.209	1.356	1.538	1.782	2.179	2.681	3.055
13	1.204	1.350	1.530	1.771	2.160	2.650	3.012
14	1.200	1.345	1.523	1.761	2.145	2.624	2.977
15	1.197	1.341	1.517	1.753	2.131	2.602	2.947
16	1.194	1.337	1.512	1.746	2.120	2.583	2.921
17	1.191	1.333	1.508	1.740	2.110	2.567	2.898
18	1.189	1.330	1.504	1.734	2.101	2.552	2.878
19	1.187	1.328	1.500	1.729	2.093	2.539	2.861
20	1.185	1.325	1.497	1.725	2.086	2.528	2.845
21	1.183	1.323	1.494	1.721	2.080	2.518	2.831
22	1.182	1.321	1.492	1.717	2.074	2.508	2.819
23	1.180	1.319	1.489	1.714	2.069	2.500	2.807
24	1.179	1.318	1.487	1.711	2.064	2.492	2.797
25	1.178	1.316	1.485	1.708	2.060	2.485	2.787
26	1.177	1.315	1.483	1.706	2.056	2.479	2.779
27	1.176	1.314	1.482	1.703	2.052	2.473	2.771
28	1.175	1.313	1.480	1.701	2.048	2.467	2.763
29	1.174	1.311	1.479	1.699	2.045	2.462	2.756
30	1.173	1.310	1.477	1.697	2.042	2.457	2.750
35	1.170	1.306	1.472	1.690	2.030	2.438	2.724
40	1.167	1.303	1.468	1.684	2.021	2.423	2.704
45	1.165	1.301	1.465	1.679	2.014	2.412	2.690
50	1.164	1.299	1.462	1.676	2.009	2.403	2.678
55	1.163	1.297	1.460	1.673	2.004	2.396	2.668
60	1.162	1.296	1.458	1.671	2.000	2.390	2.660
90	1.158	1.291	1.452	1.662	1.987	2.369	2.632
120	1.156	1.289	1.449	1.658	1.980	2.358	2.617
cc	1.15	1.28	1.44	1.645	1.96	2.33	2.58

Chi-Square Distribution Table



The shaded area is equal to α for $\chi^2 = \chi^2_\alpha$.

df	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$	$\chi^2_{.100}$	$\chi^2_{.050}$	$\chi^2_{.025}$	$\chi^2_{.010}$	$\chi^2_{.005}$
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.041	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	36.741	40.113	43.195	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	19.768	39.087	42.557	45.722	49.588	52.336
30	13.787	14.953	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	55.329	85.527	90.531	95.023	100.425	104.215
80	51.172	53.540	57.153	60.391	64.278	96.578	101.879	106.629	112.329	116.321
90	59.196	61.754	65.647	69.126	73.291	107.565	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169