MUEO

MOI UNIVERSITY

OFFICE OF THE DEPUTY VICE CHANCELLOR, ACADEMIC AFFAIRS, RESEARCH & EXTENSION

UNIVERSITY EXAMINATIONS

2013/2014 ACADEMIC YEAR

THIRD YEAR END OF SEMESTER I/II EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF BUSINESS MANAGEMENT

EXAM CODE:- **BBM 350**

COURSE TITLE:- **MANAGERIAL STATISTICS**

DATE:- 26TH MAY, 2014 **TIME:- 2.00P.M. - 5.00P.M.**

INSTRUCTION TO CANDIDATES

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BBM 350: MANAGERIAL STATISTICS

INSTRUCTIONS: *Question **ONE** is compulsory. Answer any other **THREE** questions.*

QUESTION ONE (Compulsory)

(a) Identify and briefly explain the THREE measures of central tendency. (3marks)

(b) Calculate the mean, variance and standard deviation of the following data;

12, 15, 19, 34, 46, 65, 79, 94, 108 (6marks)

(c) Distinguish between:

(i) Census and Sample method. (2marks)

(ii) Random sampling errors and Non-random sampling errors. (2marks)

(d) Discuss TWO sources of sampling bias. (2marks)

(e) A variable X follows a Poisson distribution with mean 6.

Calculate:

(i) $p(X = 0)$

(ii) $p(X > 2)$ (Given that $e^{-6} = 0.00248$) (5marks)

(f) A random sample of 12 items is taken and is found to have a mean weight of 50grams and a standard deviation of 9 grams. What is the mean weight of the population with a 99% level of confidence? (5marks)

QUESTION TWO

(a) When do we say an estimator is:

(i) Unbiased

(ii) Consistent

(iii) Sufficient (6marks)

(b) The incidence of occupational disease in an industry is such that the workers have a 20% chance of suffering from it. What is the probability that out of six workers, 4 or more will contract the disease? (5marks)

(c) A discrete random variable X follows Poisson law. Find $p(X>2)$ and p(X is at most 2), if it is given that $E(X) = 2.5$ and $e^{-2.5} = 0.0821$. (8marks)

(d) The quality department of a wire manufacturing company periodically selects a sample of wire specimens in order to test for breaking strength. Past experience

has shown that the breaking strengths of a certain type of wire are normally distributed with standard deviation of 200kg. A random sample of 64 specimens gave a mean of 6,200kg. Find out the population mean at 95% level of confidence. (6marks)

QUESTION THREE

(a) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, determine the number of students who score;

(i) Between 12 and 15?
(ii) Above 18?
(iii) Below 8?
(iv) Between 15 and 18? (12marks)

(b) Identify and briefly explain the TWO main categories of statistical inference. (4marks)

(c) (i) State FIVE reasons for holding stocks. (5marks)

(ii) Explain FOUR costs associated with inventory. (4marks)

QUESTION FOUR

(a) Distinguish between one-tailed tests and two-tailed tests in statistics. (2marks)

(b) Briefly explain Type I and Type II error in hypothesis testing. (2marks)

(c) State the conditions of applying the Chi-square. (3marks)

(d) A university administrator was seeking for opinion on whether or not lecturers should be given greater powers to discipline students who misbehave in class. A random sample of 300 adults was obtained and the following data was obtained;

	Observed Frequencies			
Gender	For	Against	No opinion	Total
Men	93	70	`12	175
Women	87	32	6	125
Total	180	102	18	300

Required;

(i) State the null and alternate hypothesis. (2marks)
(ii) At 95% confidence level, test the null hypothesis and state whether or not there is any difference in opinions between the genders. (16marks)

QUESTION FIVE

(a) Define students't' distribution. (1mark)

(b) A machine fills packets with spice which are supposed to have a mean weight of 40 grams. A random sample of 36 packets is taken and the mean weight is found to be 42.4 grams with a standard deviation of 6 grams.

Required;
Conduct a significance test at 5% level of significance. (9marks)

(c) A company ordered bags of chemicals with a nominal weight of 50kg. A random sample of 8 bags was taken and it was found that the sample mean was 49.2kg with a standard deviation of 1.6kg.

Required;
Test whether the mean weight of the sample of bags is significantly less than the nominal weight using a 5% level of significance. (9marks)

(d) Explain the meaning of the following methods of sampling;

(i) Systematic Sampling

(ii) Stratified Sampling

(iii) Multi Stage Sampling (6marks)

Table Z: Areas under the standard normal curve (positive Z)

	Second decimal place in z									
z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998
3.5	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998	0.9998
3.6	0.9998	0.9998	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.7	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.8	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999	0.9999
3.9	* 1.0000									

* For values of $z \geq 3.90$, the areas are 1.0000 to four decimal places

Table T: Critical values for the Student's T distributions

two tail probability		0.20	0.10	0.05	0.02	0.01	
one tail probability		0.10	0.05	0.025	0.01	0.005	
	df						df
	1	3.078	6.314	12.706	31.821	63.657	1
	2	1.886	2.920	4.303	6.965	9.925	2
	3	1.638	2.353	3.182	4.541	5.841	3
	4	1.533	2.132	2.776	3.747	4.604	4
	5	1.476	2.015	2.571	3.365	4.032	5
	6	1.440	1.943	2.447	3.143	3.707	6
	7	1.415	1.895	2.365	2.998	3.499	7
	8	1.397	1.860	2.306	2.896	3.355	8
	9	1.383	1.833	2.262	2.821	3.250	9
	10	1.372	1.812	2.228	2.764	3.169	10
	11	1.363	1.796	2.201	2.718	3.106	11
	12	1.356	1.782	2.179	2.681	3.055	12
	13	1.350	1.771	2.160	2.650	3.012	13
	14	1.345	1.761	2.145	2.624	2.977	14
	15	1.341	1.753	2.131	2.602	2.947	15
	16	1.337	1.746	2.120	2.583	2.921	16
	17	1.333	1.740	2.110	2.567	2.898	17
	18	1.330	1.734	2.101	2.552	2.878	18
	19	1.328	1.729	2.093	2.539	2.861	19
	20	1.325	1.725	2.086	2.528	2.845	20
	21	1.323	1.721	2.080	2.518	2.831	21
	22	1.321	1.717	2.074	2.508	2.819	22
	23	1.319	1.714	2.069	2.500	2.807	23
	24	1.318	1.711	2.064	2.492	2.797	24
	25	1.316	1.708	2.060	2.485	2.787	25
	26	1.315	1.706	2.056	2.479	2.779	26
	27	1.314	1.703	2.052	2.473	2.771	27
	28	1.313	1.701	2.048	2.467	2.763	28
	29	1.311	1.699	2.045	2.462	2.756	29
	30	1.310	1.697	2.042	2.457	2.750	30
	32	1.309	1.694	2.037	2.449	2.738	32
	35	1.306	1.690	2.030	2.438	2.724	35
	40	1.303	1.684	2.021	2.423	2.704	40
	45	1.301	1.679	2.014	2.412	2.690	45
	50	1.299	1.676	2.009	2.403	2.678	50
	60	1.296	1.671	2.000	2.390	2.660	60
	75	1.293	1.665	1.992	2.377	2.643	75
	90	1.291	1.662	1.987	2.368	2.632	90
	120	1.289	1.658	1.980	2.358	2.617	120
	150	1.287	1.655	1.976	2.351	2.609	150
	250	1.285	1.651	1.969	2.341	2.596	250
	500	1.283	1.648	1.965	2.334	2.586	500
	750	1.283	1.647	1.963	2.331	2.582	750
	1000	1.282	1.646	1.962	2.330	2.581	1000
normal	∝ (z)	1.282	1.645	1.960	2.326	2.576	(z) ∝
confidence levels		80%	90%	95%	98%	99%	

Table χ^2: Critical values for the Chi-Squared distributions

Right tail probability	0.10	0.05	0.025	0.01	0.005
df					
1	2.706	3.841	5.024	6.635	7.879
2	4.605	5.991	7.378	9.210	10.597
3	6.251	7.815	9.348	11.345	12.838
4	7.779	9.488	11.143	13.277	14.860
5	9.236	11.070	12.833	15.086	16.750
6	10.645	12.592	14.449	16.812	18.548
7	12.017	14.067	16.013	18.475	20.278
8	13.362	15.507	17.535	20.090	21.955
9	14.684	16.919	19.023	21.666	23.589
10	15.987	18.307	20.483	23.209	25.188
11	17.275	19.675	21.920	24.725	26.757
12	18.549	21.026	23.337	26.217	28.300
13	19.812	22.362	24.736	27.688	29.819
14	21.064	23.685	26.119	29.141	31.319
15	22.307	24.996	27.488	30.578	32.801
16	23.542	26.296	28.845	32.000	34.267
17	24.769	27.587	30.191	33.409	35.718
18	25.989	28.869	31.526	34.805	37.156
19	27.204	30.144	32.852	36.191	38.582
20	28.412	31.410	34.170	37.566	39.997
21	29.615	32.671	35.479	38.932	41.401
22	30.813	33.924	36.781	40.289	42.796
23	32.007	35.172	38.076	41.638	44.181
24	33.196	36.415	39.364	42.980	45.559
25	34.382	37.652	40.646	44.314	46.928
26	35.563	38.885	41.923	45.642	48.290
27	36.741	40.113	43.195	46.963	49.645
28	37.916	41.337	44.461	48.278	50.993
29	39.087	42.557	45.722	49.588	52.336
30	40.256	43.773	46.979	50.892	53.672
40	51.805	55.758	59.342	63.691	66.766
50	63.167	67.505	71.420	76.154	79.490
60	74.397	79.082	83.298	88.379	91.952
70	85.527	90.531	95.023	100.425	104.215
80	96.578	101.879	106.629	112.329	116.321
90	107.565	113.145	118.136	124.116	128.299
100	118.498	124.342	129.561	135.807	140.169
110	129.385	135.480	140.917	147.414	151.948
120	140.233	146.567	152.211	158.950	163.648