UNIVERSITY OF SWAZILAND

FACULTY OF SOCIAL SCIENCE

DEPARTMENT OF ECONOMICS

MAIN EXAMINATION

MAY 2015

TITLE OF PAPER: STATISTICS FOR ECONOMISTS

COURSE CODE: ECON 209

TIME ALLOWED: THREE (3) HOURS

INSTRUCTIONS:

1. ANSWER FOUR (4) QUESTIONS:

   QUESTION ONE(1) IS COMPULSORY AND YOU CAN THEN CHOOSE ANY THREE (3) QUESTIONS FROM THE REMAINING FIVE(5) QUESTIONS PROVIDED.

2. ALL QUESTIONS CARRY 25 MARKS EACH

3. IN EVERY STAGE OF YOUR CALCULATIONS ROUND YOUR ANSWER TO TWO (2) DECIMAL PLACES.

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QUESTION 1 (compulsory)

a) Mbabane Highlanders has a probability 1/3 of winning when ever it plays. If the team plays 6 games, find the probability that it wins :

i) Exactly 4 games, **(3)**

ii) At least 2 games, **(3)**

iii) More than half of the games. **(3)**

b) Let X be a random variable with the standard normal distribution. Determine the value of b if :

i) $P(b \leq X \leq 2) = 0.10000$ **(4)**

ii) $P(X \leq b) = 0.7967$ **(2)**

c) Suppose that 4% of the Puma jackets made by Spintex Swaziland are defective. Find the probability that there are 12 defective jackets in a sample of 200 items. **(5)**

d) Differentiate between an experiment and a trial. **(2)**

e) Outline the axioms of probability. **(3)**

QUESTION 2

a) Leites Toyota produces shock absorbers whose weights are assumed to be distributed normally. A sample of 10 shock absorbers has weights in kilograms which are distributed as follows:

8.9 7.4 8.7 8.7 8.2 7.2 7.7 6.9 8.4 7.9

i) Find the mean and standard deviation weight of the sample **(10)**

ii) Use the information you got in i) to construct a 99% confidence interval for the true mean weight of all the shock absorbers. **(8)**

b) Differentiate between point and interval estimation **(4)**

c) Define statistical inference **(3)**

QUESTION 3

a) Write short explanatory notes on the following: **(3 marks each)**

i) Differentiate between type I and type II errors

ii) Level of significance

iii) Statistical hypotheses

b) A company is proposing to introduce a new system of production bonuses with the aim of improving productivity. Last year the average production per worker per day was 1,020. Before introducing the bonuses throughout the company, the company decides to test the new bonus scheme on a random sample of 80 workers. The mean production per day for the sample was found to be 1,050 with a standard deviation of 120. Is there any evidence that the bonus scheme has improved productivity? **(16)**

QUESTION 4

Let Y be the dependent variable and X be the independent variable

X	Y
4	3
7	5
3	1
6	3

i) Plot a scatter diagram showing the relationship between the two variables **(4)**

ii) Estimate the regression line **(12)**

iii) Calculate the standard error of estimate. **(4)**

iv) Calculate the coefficient of determination and interpret your results **(5)**

QUESTION 5

A company decided to examine bad debts. A random sample of 200 bad debts was taken; the distribution of the length of life of these bad debts is given in the table below:

Number of working days	% of bad debts
1 – 5	22
6 – 10	25
11 – 15	21
16 – 20	14
21 – 25	8
26 – 30	7
31 – 35	3

i) Calculate the mean and standard deviation of the length of life of bad debts. **(10)**

ii) In the previous year the mean length of life of debts was 11.4 working days. Is there any evidence that the mean length of life of bad debts has changed? **(15)**

QUESTION 6

Write short explanatory notes on the following: **(5 marks each)**

i) Correlation coefficient

ii) Least squares regression line

iii) Standard error of estimate

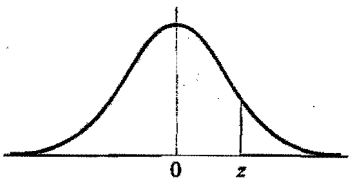
iv) What is a random variable?

v) Define conditional probability.

!!GOODLUCK!!!

APPENDIX C

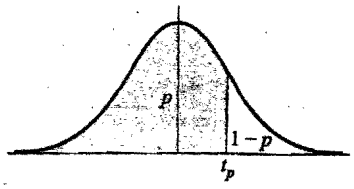
Areas under the Standard Normal Curve from 0 to z



z	0	1	2	3	4	5	6	7	8	9
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0754
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	.2258	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2612	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2996	.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	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.7	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.8	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999	.4999
3.9	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000	.5000

APPENDIX D

Percentile Values t_p for Student's t Distribution with ν Degrees of Freedom



ν	$t_{.55}$	$t_{.60}$	$t_{.70}$	$t_{.75}$	$t_{.80}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$
1	.158	.325	.727	1.000	1.376	3.08	6.31	12.71	31.82	63.66
2	.142	.289	.617	.816	1.061	1.89	2.92	4.30	6.96	9.92
3	.137	.277	.584	.765	.978	1.64	2.35	3.18	4.54	5.84
4	.134	.271	.569	.741	.941	1.53	2.13	2.78	3.75	4.60
5	.132	.267	.559	.727	.920	1.48	2.02	2.57	3.36	4.03
6	.131	.265	.553	.718	.906	1.44	1.94	2.45	3.14	3.71
7	.130	.263	.549	.711	.896	1.42	1.90	2.36	3.00	3.50
8	.130	.262	.546	.706	.889	1.40	1.86	2.31	2.90	3.36
9	.129	.261	.543	.703	.883	1.38	1.83	2.26	2.82	3.25
10	.129	.260	.542	.700	.879	1.37	1.81	2.23	2.76	3.17
11	.129	.260	.540	.697	.876	1.36	1.80	2.20	2.72	3.11
12	.128	.259	.539	.695	.873	1.36	1.78	2.18	2.68	3.06
13	.128	.259	.538	.694	.870	1.35	1.77	2.16	2.65	3.01
14	.128	.258	.537	.692	.868	1.34	1.76	2.14	2.62	2.98
15	.128	.258	.536	.691	.866	1.34	1.75	2.13	2.60	2.95
16	.128	.258	.535	.690	.865	1.34	1.75	2.12	2.58	2.92
17	.128	.257	.534	.689	.863	1.33	1.74	2.11	2.57	2.90
18	.127	.257	.534	.688	.862	1.33	1.73	2.10	2.55	2.88
19	.127	.257	.533	.688	.861	1.33	1.73	2.09	2.54	2.86
20	.127	.257	.533	.687	.860	1.32	1.72	2.09	2.53	2.84
21	.127	.257	.532	.686	.859	1.32	1.72	2.08	2.52	2.83
22	.127	.256	.532	.686	.858	1.32	1.72	2.07	2.51	2.82
23	.127	.256	.532	.685	.858	1.32	1.71	2.07	2.50	2.81
24	.127	.256	.531	.685	.857	1.32	1.71	2.06	2.49	2.80
25	.127	.256	.531	.684	.856	1.32	1.71	2.06	2.48	2.79
26	.127	.256	.531	.684	.856	1.32	1.71	2.06	2.48	2.7
27	.127	.256	.531	.684	.855	1.31	1.70	2.05	2.47	2.7
28	.127	.256	.530	.683	.855	1.31	1.70	2.05	2.47	2.7
29	.127	.256	.530	.683	.854	1.31	1.70	2.04	2.46	2.7
30	.127	.256	.530	.683	.854	1.31	1.70	2.04	2.46	2.7
40	.126	.255	.529	.681	.851	1.30	1.68	2.02	2.42	2.7
60	.126	.254	.527	.679	.848	1.30	1.67	2.00	2.39	2.6
120	.126	.254	.526	.677	.845	1.29	1.66	1.98	2.36	2.6
∞	.126	.253	.524	.674	.842	1.28	1.645	1.96	2.33	2.

Source: R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, published by Longman Grou London (previously published by Oliver and Boyd, Edinburgh), and by permission of the authors and publishers.