

**UNIVERSITY OF SWAZILAND  
FACULTY OF SOCIAL SCIENCE  
DEPARTMENT OF ECONOMICS**

**MAIN EXAMINATION**

**MAY 2011**

**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.**

**THIS PAPER IS NOT SUPPOSED TO BE OPENED UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR**

**QUESTION 1 (compulsory)**

- a) Mbabane Highlanders has a probability  $\frac{2}{3}$  of winning when ever it plays. If the team plays 4 games, find the probability that it wins :
- i) Exactly 2 games, (3)
  - ii) At least 1 game, (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 2% of the items made by a factory are defective. Find the probability that there are 3 defective items in a sample of 100 items. (5)
- d) Differentiate between an experiment and a trial. (2)
- e) Outline the axioms of probability. (3)

**QUESTION 2**

- a) A factory produces castings whose weights are assumed to be distributed normally. A sample of 10 castings has weights in kilograms which are distributed as follows:
- 7.4    7.9    8.2    8.7    6.9    7.2    7.7    8.4    8.7    8.9
- i) Find the mean and standard deviation weight of the sample (10)
  - ii) Use the information you got in i) to construct a 95% confidence interval for the true mean weight of all the castings. (8)
- b) Differentiate between point and interval estimation (4)
- c) Statistical Inference (3)

**QUESTION 3**

a) Write short explanatory notes on the following:

**(3 marks each)**

- i) Statistical hypotheses
- ii) Differentiate between type I and type II errors
- iii) Level of significance

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 through out the company, the company decides to test the new bonus scheme on a random sample of 60 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
3	4
5	7
1	3
3	6

- 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.

**GOOD LUCK!!GOODLUCK!!**

A large grid of graph paper, consisting of a series of small squares. A single dot is located in the center of the grid. The grid is mostly empty, with no text or other markings.

## Normal distribution table

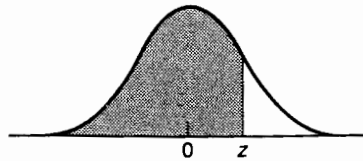


Fig. A.1

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7275	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7901	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9983	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990