

DEPARTMENT OF STATISTICS AND DEMOGRAPHY

SUPPLEMENTARY EXAMINATION, 2009/10

COURSE TITLE: DESCRIPTIVE STATISTICS

COURSE CODE: ST 132

TIME ALLOWED: TWO (2) HOURS

INSTRUCTION: ANSWER ANY THREE QUESTIONS
ALL QUESTIONS CARRY EQUAL MARKS (20 MARKS)

SPECIAL REQUIREMENTS: SCIENTIFIC CALCULATORS AND STATISTICAL TABLES

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Question 1

(a) A coin is biased so that a head is twice as likely to occur as a tail. If the coin is tossed 3 times, what is the probability of getting two tails and one head? **(5 marks)**

(b) There are 90 applicants for a job with the news department of a television station. Some of them are college graduates and some are not, some have at least three years experience and some have not, with the exact breakdown being:

	College Graduate	Not College Graduate
At least three years experience	18	9
Less than three years experience	36	27

If the order in which the applicants are interviewed by the station manager is random, G is the event that the applicant interviewed is a college graduate, and T is the event that the applicant interviewed has at least three years experience, determine each of the following probabilities:

- (a) $P(G)$ (b) $P(T')$ (c) $P(G \cap T)$ (d) $P(G' \cap T')$
 (e) $P(T|G)$ (f) $P(G'|T')$

(2+2+2+2+3+4 marks)

Question 2

Following is a distribution of the number of mistakes that 80 graduate students made in translating a passage from French to English as part of the language requirement for an advanced degree.

Number of mistakes	Number of students
0-4	34
5-9	20
10-14	15
15-19	9
20-24	2

Calculate

- (a) the mean;
 (b) the median;
 (c) the standard deviation

(5+5+5 marks)

(d) Following are the numbers of whales seen breaching on 60 whale-watching trips off the coast of Baja California:

10	18	14	9	7	3	14	16	15	8	12	18
13	6	11	22	18	8	22	13	10	14	8	5
8	12	16	21	13	10	7	3	15	24	16	18
12	18	10	8	6	13	12	9	18	23	15	11
19	10	11	15	12	6	4	10	13	27	14	6

Group the data into a distribution with the classes 0-4, 5-9, 10-14, 15-19, 20-24 and 25-29. **(5 marks)**

Question 3

a) A discrete random variable can be described by the binomial distribution if it satisfies four conditions. What are those conditions? **(2 marks)**

b) Twenty companies were asked whether or not they provide retirement benefits to their employees. Fourteen of the companies said they do provide retirement benefits to their employees and six said they do not. Five companies are randomly selected from these 20. Find the probabilities that:

- i. Exactly two of them provide retirement benefits to their employees.
- ii. None of them provides retirement benefits to their employees.
- iii. At most one of them provides retirement. **(3+3+3 marks)**

b) An average of 5 customers come to the First National Bank every half hour.

- i. Find the probability that exactly two customers will come to this bank during a given hour.
- ii. Find the probability that during a given hour, the number of customers who will come to this bank is:
 - a. Fewer than five
 - b. Five or more **(3+3+3 marks)**

Question 4

(a) The life span of an automatic washer is approximately normally distributed, with mean and standard deviation equal to 3.1 and 1.2 years, respectively. If this type of washer is guaranteed for 1 year, what fraction of original sales will require replacement? **(7 marks)**

(b) The average length of time required to complete a college achievement test was found to equal 70 minutes, with a standard deviation of 12 minutes. When should the test be terminated if you wish to allow sufficient time for 90% of the students to complete the test? (Assume that the time required to complete the test is normally distributed) **(6 marks)**

(c) Let x be a continuous random variable that is normally distributed with a mean of 65 and a standard deviation of 15. Find the probability that x assumes a value:
i) Less than 43 ii) Greater than 74 iii) Between 56 and 71 **(2+2+3 marks)**

Question 5

(a) An automobile company wanted to investigate how the price of one of its models depreciates with age. The research department took a sample of eight cars of this model and collected the following information on the ages (in years) and prices (in thousands of dollars) of these cars.

Age	8	3	6	9	2	5	6	3
Price	18	94	50	21	145	42	36	99

- (i) Find the regression line with price as a dependent variable and age as an independent variable; interpret it and predict the price of a 7-year-old car of this model. **(10 marks)**
- (ii) Compute the Pearson's correlation coefficient for the two random variables (age and price). **(10 marks)**

END OF EXAM!!

Table E The Standard Normal Distribution

<i>z</i>	.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

Note: Use 0.4999 for *z* values above 3.09.

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