

DEPARTMENT OF STATISTICS AND DEMOGRAPHY

MAIN EXAMINATION, 2007/8

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

The following data represent yearly sales volumes and their advertising expenditure for a large carpet manufacturing firm over a period of 10 years.

Year	Sales Volume (Million E)	Advertising Expenditure (Million E)
1991	26	1.8
1992	31	2.3
1993	28	2.6
1994	30	2.4
1995	34	2.8
1996	38	3.0
1997	41	3.4
1998	44	3.2
1999	40	3.6
2000	43	3.8

- (a) Which is the dependent and independent variable? **(2 marks)**
 (b) Find the least-squares estimated regression line. **(10 marks)**
 (c) Determine a point estimate for the mean sales volume with advertising expenditure of 3.5 million Emalangeneni. **(2 marks)**
 (d) Calculate r and comment on the strength of the relationship. **(6 marks)**

Question 2

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	Totals
At least three years experience	18	9	27
Less than three years experience	36	27	63
Totals	54	36	90

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

- (a) $P(G)$ **(2 marks)**
 (b) $P(T')$ **(2 marks)**
 (c) $P(G \cap T)$ **(4 marks)**
 (d) $P(G' \cap T')$ **(4 marks)**
 (e) $P(T | G)$ **(4 marks)**
 (f) $P(G' | T')$ **(4 marks)**

Question 3

Using the following quarterly sales for the firm for the years 2000 to 2002:

(a) Compute the 4-quarter moving averages and the centred moving averages for the data.

(8 marks)

(b) Compute the seasonal indexes for the four quarters and deseasonalise the data.

(7 marks)

(c) Find a linear trend expression for the above time series

(5 marks)

Year	Quarter	Sales (000s)
2000	1	2.5
	2	1.5
	3	2.4
	4	1.6
2001	1	2.0
	2	1.4
	3	1.7
	4	1.9
2002	1	2.7
	2	2.0
	3	2.4
	4	2.1

Question 4

The 50 measurements on acid rain in Wisconsin are:

3.58 3.80 4.01 4.01 4.05 4.05 4.12 4.18 4.20 4.21
 4.27 4.28 4.30 4.32 4.33 4.35 4.35 4.41 4.42 4.45
 4.45 4.50 4.50 4.50 4.50 4.51 4.52 4.52 4.52 4.57
 4.58 4.60 4.61 4.61 4.62 4.62 4.65 4.70 4.70 4.70
 4.70 4.72 4.78 4.78 4.80 5.07 5.20 5.26 5.41 5.48

(a) Calculate the median and the quartiles

(10 marks)

(b) Find the 90th percentile

(3 marks)

(c) Determine the mean and standard deviation.

(7 marks)

Question 5

The service time of the first service of a BMW car is found to be normally distributed with a mean of 70 minutes and variance of 81 minutes.

- (i) If a customer brings her BMW car for its first service, what is the probability that the car will be ready within one hour? **(5 marks)**
- (ii) What is the probability that the job will take more than an hour and a half? **(5 marks)**
- (iii) What is the probability that the first service will be completed between 50 and 60 minutes? **(5 marks)**
- (iv) If the BMW dealer wants to ensure that no more than 5% of all first service will take longer than 80 minutes, what should be the mean service time be? **(5 marks)**

END OF EXAM!!

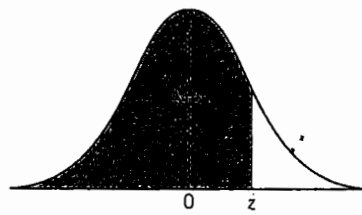


TABLE 3 Areas under the Normal Curve

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0017	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0722	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

