

DEPARTMENT OF STATISTICS AND DEMOGRAPHY

MAIN 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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INVIGILATOR**

**Question 1**

A fish shop owner recorded the daily turnover (in Emalangeni) of his outlet for 300 trading days as shown in the frequency table.

Daily Turnover	No. of Days
500 - < 750	15
750 - < 1000	23
1000 - < 1250	55
1250 - < 1500	92
1500 - < 1750	65
1750 - < 2000	50

- (i) Find the average and median daily turnover of the fish shop. Interpret its meaning.
- (ii) Identify the maximum daily turnover associated with the slowest 25% of trading days.
- (iii) What daily turnover separates the busiest 25% of trading days from the rest?

**(10+5+5 marks)**

**Question 2**

A random sample of 250 students majoring on Psychology or Communications at a large University is selected. The students are asked whether or not they are happy with their majors. The following table gives the results of the survey. Assume that none of the 250 students is majoring in both areas.

	Happy with major	Unhappy with major
Psychology	80	20
Communications	115	35

- a. If one student is selected at random from this group, find the probability that this student is:
  - i. happy with the choice of major
  - ii. a Psychology major
  - iii. a Communications major given that the student is happy with the choice of major
  - iv. unhappy with the choice of major given that the student is a Psychology major
  - v. a Psychology major and is happy with that major
  - vi. a Communications major OR is unhappy with his or her major

- b. Are "Psychology major" and "Happy with major" independent? Explain why or why not.

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

**Question 3**

- a) 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. **(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. **(3 marks)**
- (c) 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? **(5 marks)**
- (d) 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
- (3+3+3 marks)**

**Question 4**

(a) The following scores were obtained by UNISWA first year students on a Statistics test:

60 94 75 82 72 57 92 75 85 77 91 72 85 77  
 68 49 67 74 45 76 73 68 85 73 83 61 65 69  
 79 64 72 55 93 56 67 78 81 90 76 70 71 56  
 69 82 67 70 55 48 78 50

(a) Calculate the inter-quartile range of these scores.

**(8 marks)**

(b) The following table gives the frequency distribution of times (in minutes) that 50 commuter students at a large University spent looking for parking spaces on the first day of classes in the first semester of 2007.

Time	Number of students
0 to less than 4	4
4 to less than 8	7
8 to less than 12	15
12 to less than 16	18
16 to less than 20	6
20 to less than 24	3

Find the variance and standard deviation

**(8 marks)**

(c) The minimum temperature for three widely separated locations across Swaziland on 1<sup>st</sup> January 2004 were recorded as 15<sup>o</sup>F at location A, 62<sup>o</sup>F at location B and 30<sup>o</sup>F at location C. A check with the meteorology department produced the following data for these three locations for the last 20 years.

	A	B	C
Mean temperature	20 <sup>o</sup> F	71.0 <sup>o</sup> F	5.0 <sup>o</sup> F
Standard deviation	4.5 <sup>o</sup> F	6.9 <sup>o</sup> F	2.3 <sup>o</sup> F

Relatively speaking, which location on the 1<sup>st</sup> January 2004, experienced the coolest day?

**(4 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)**

(b) The seasonal/quarterly turnover in (millions Emalangeni) in 2004-2006 in the hotel industry at Ezulwini are:

Season	2004	2005	2006
Summer	568	604	662
Autumn	495	544	605
Winter	252	270	310
Spring	315	510	535

- (i) Deseasonalise the hotel industry turnover data for 2004–2006.  
 (ii) Derive a trend line equation and estimate turnover for the first two seasons of 2007. **(10 marks)**

**END OF EXAM!!**

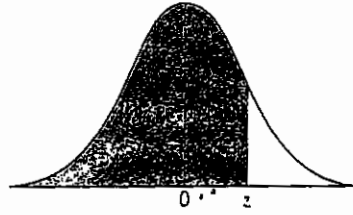


TABLE 3 Areas under the Normal Curve

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

