



KENYATTA UNIVERSITY
DIGITAL SCHOOL OF VIRTUAL AND OPEN LEARNING (DSVOL)
EXAMINATION FOR THE DEGREE OF BACHELOR OF INFORMATION
TECHNOLOGY
SIT 110: INTRODUCTION TO STATISTICS

2ND TRIMESTER 2023/2024

TIME: 2 HRS

INSTRUCTIONS: Answer Question One (Compulsory) and any other Two Questions.

QUESTION ONE (30 MARKS)

- a) Define the following terms:
- i. Statistics (1 mark)
 - ii. Statistic (1 mark)
 - iii. Equally-likely events (1 mark)
 - iv. Probability (1 mark)
- b) The data given below pertain to a random sample of disbursement of state highway funds (in millions of dollars), to different states
118 150 282 282 780 171 685 537
Determine the:
- i. Mean (2 marks)
 - ii. Mode (1 mark)
 - iii. Harmonic mean (2 marks)
 - iv. Geometric mean (2 marks)
- c) Lengths of metal strip produced by a machine are normally distributed with mean, $\mu = 150$ cm and a standard deviation, $\sigma = 10$ cm. What is the probability that the length of a randomly selected strip is shorter than 165 cm? (3 marks)
- d) In a survey on washing powder, it is found that the probability that a shopper chooses Soapsuds is 0.25. What is the probability that in a random sample of nine shoppers, more than seven choose Soapsuds? (3 marks)

- e) The radon concentration (*in pCi per liter*) data obtained from 8 houses in a certain area are given below:

2.9 0.6 13.5 17.1 2.8 3.8 16.0 2.1

Determine the coefficient of variation (5 marks)

- f) State four characteristics of the standard normal distribution curve (4 marks)
- g) A bag contains seven black and three white marbles. Three marbles are chosen at random and in succession, each marble being replaced after it has been taken out of the bag. Draw a tree diagram to show all the possible selections and hence calculate the probability of choosing three black marbles (4 marks)

QUESTION TWO (20 MARKS)

- a) Patients at a chest clinic were asked to keep a record of the number of cigarettes they smoked each day. The data is as shown in the table below:

<i>Cigarettes</i>	0-9	10-19	20-29	30-39	40-49	50-59
<i>Frequency</i>	5	8	32	41	16	2

Determine the:

- Mean (3 marks)
 - Median (3 marks)
 - Mode (3 marks)
 - Standard deviation (3 marks)
 - First quartile (3 marks)
- b) The table below shows the marks awarded to six children in a competition.

<i>Child</i>	A	B	C	D	E	F
<i>Judge 1</i>	6.8	7.3	8.1	9.8	7.1	9.2
<i>Judge 2</i>	7.8	9.4	7.9	9.6	8.9	6.9

Determine the Spearman's rank correlation coefficient for the data (5 marks)

QUESTION THREE (20 MARKS)

- a) The maximum temperature in °C, measured to the nearest degree was recorded each day in a week in Dallas with the following result:

19 23 20 12 22 31 17

Determine the geometric mean of the data (4 marks)

- b) The masses of packages from a particular machine are normally distributed with a mean, $\mu = 200\text{ g}$ and a standard deviation, $\sigma = 2\text{ g}$. Determine the probability that a randomly selected package from the machine weighs:
- Less than 197 g (3 marks)
 - More than 200.5 g (3 marks)
 - Between 198.5 g and 199.5 g (4 marks)
- c) The heat output of wood is known to vary with the percentage moisture content. The table below shows, in suitable units, the data obtained from an experiment carried out to access this variation.

<i>Moisture content, x</i>	50	8	34	22	45	15	74	82
<i>Heat output, y</i>	5.5	7.4	6.2	6.8	5.5	7.1	4.4	3.9

Determine the Pearson's correlation coefficient for the data (6 marks)

QUESTION FOUR (20 MARKS)

- a) The following table shows the amount of water, in liters, applied to seven similar plots on an experimental farm. It also shows the yield of hay in tonnes per acre.

<i>Amount of water, x</i>	30	45	60	75	90	105	120
<i>Yield of hay, y</i>	4.85	5.20	5.76	6.60	7.35	7.95	7.77

- Determine the least square regression equation of y on x for the set of data (7 marks)
 - Use the equation to estimate the value of y at $x = 28$ (3 marks)
- b) A sample of six of the largest accounting firms in the United States and the number of partners associated with each firm as reported by the Public Accounting Report is as shown below:

Firm	Number of partners
Price Waterhouse	1062
McGladrey & Pullen	381
Deloitte & Touché	1719
Andersen Worldwide	1673
Coopers & Lybrand	1277
BDO Seidmann	217

Determine the mean deviation from the mean (5 marks)

- c) At Sellitall Supermarket, 60% of customers pay by Credit card. Determine the probability that in a randomly selected sample of ten customers:
- Exactly two pay by Credit card (2 marks)
 - More than seven pay by Credit card (3 marks)

QUESTION FIVE (20 MARKS)

- a) The packaging of an electric light bulb states that the average length of life of bulbs is 1000 hours. A consumer association thinks that this is an overestimate and tests a random sample of 64 bulbs, recording the life x hours, of each bulb. The results are summarized as follows:
 $\sum x = 63910.4$ and $\sum x^2 = 63824061$
- Determine the sample mean, $\bar{x}$ (2 marks)
 - Determine an estimate for the standard deviation of the length of life of all light bulbs of this type (4 marks)
 - Is there evidence, at the 10% significance level, that the statement on the packaging is overestimating the length of life of this type of light bulb? (7 marks)
- b) The management of a large hospital states that the mean age of its patients is 45 years. Records of a random sample of 100 patients give a mean age of 48.4 years. Using a population standard deviation of 18 years, test at the 5% significance level whether there is evidence that the management's statement is incorrect (7 marks)

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11123	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46812	.46414

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Z	.00	.01	.02	.03	.04	.05	.06	.07	.08
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188
0.1	.53983	.54380	.54776	.55172	.55567	.55962	.56356	.56749	.57142
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295
1.6	.94520	.94630	.94738	.94845	.94950	.95053	.95154	.95254	.95352
1.7	.95543	.95637	.95728	.95818	.95907	.95994	.96080	.96164	.96246
1.8	.96407	.96485	.96562	.96638	.96712	.96784	.96856	.96926	.96995
1.9	.97128	.97193	.97257	.97320	.97381	.97441	.97500	.97558	.97615
2.0	.97725	.97778	.97831	.97882	.97932	.97982	.98030	.98077	.98124
2.1	.98214	.98257	.98300	.98341	.98382	.98422	.98461	.98500	.98537
2.2	.98610	.98645	.98679	.98713	.98745	.98778	.98809	.98840	.98870
2.3	.98928	.98956	.98983	.99010	.99036	.99061	.99086	.99111	.99134
2.4	.99180	.99202	.99224	.99245	.99266	.99286	.99305	.99324	.99343
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99889	.99893	.99896
3.1	.99903	.99906	.99910	.99913	.99916	.99918	.99921	.99924	.99926
3.2	.99931	.99934	.99936	.99938	.99940	.99942	.99944	.99946	.99948
3.3	.99952	.99953	.99955	.99957	.99958	.99960	.99961	.99962	.99964
3.4	.99966	.99968	.99969	.99970	.99971	.99972	.99973	.99974	.99975
3.5	.99977	.99978	.99978	.99979	.99980	.99981	.99981	.99982	.99983
3.6	.99984	.99985	.99985	.99986	.99986	.99987	.99987	.99988	.99988
3.7	.99989	.99990	.99990	.99990	.99991	.99991	.99992	.99992	.99992
3.8	.99993	.99993	.99993	.99994	.99994	.99994	.99994	.99995	.99995
3.9	.99995	.99995	.99996	.99996	.99996	.99996	.99996	.99996	.99997