UNIVERSITY COLLEGE TATI

UNIVERSITY COLLEGE TATI (UC TATI)

FINAL EXAMINATION QUESTION BOOKLET	
COURSE CODE	: FGE 1133
COURSE	: BASIC STATISTICS
SEMESTER/SESSION	: 3-2024/2025
DURATION	: 3 HOURS

Instructions:

1. This booklet contains **10** questions. Answer **ALL** questions.
2. All answers should be written in answer booklet.
3. Write legibly and draw sketches wherever required.
4. If in doubt, raise your hands and ask the invigilator.

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

THIS BOOKLET CONTAINS 8 PRINTED PAGES INCLUDING COVER PAGE

INSTRUCTION: ANSWER ALL QUESTIONS.

QUESTION 1

The following are the volumes (in ounces) of the Coke in five different cans. Using these data as a sample, compute the following descriptive statistics.

12.3	12.1	12.2	12.3	12.2

a) Mean (2 marks)

b) Range (2 marks)

c) IQR (2 marks)

QUESTION 2

The following is the KWS computer science aptitude test was given to 50 students. The following frequency distribution resulted from their scores:

KWS Test Score	Frequency
0-4	4
5-9	8
10-14	8
15-19	20
20-24	6
25-29	4

Find:

a) The mean of the KWS test score. (3 marks)

b) The standard deviation of the KWS test score. (3 marks)

c) The mode of the KWS test score. (3 marks)

d) The Pearson coefficient skewness. (2 marks)

QUESTION 3

A group of files in a medical clinic classifies the patients by gender and by type of diabetes (Type 1 and Type 2). The groupings may be shown as follows. The table gives the number in each classification.

	Type of Diabetes	
Gender	Type 1 (A)	Type 2 (A')
Male (M)	30	15
Female (M')	35	20

a) Develop a joint probability table for these data. (3 marks)

b) Find $P(M)$ (1 mark)

c) Find $P(M' \cap A')$ (1 mark)

d) Find $P(M \mid A)$ (3 marks)

e) Is event M and A are independent? (3 marks)

QUESTION 4

Given $P(A \, or \, B) = 1$, $P(A \, and \, B) = 0.3$ and $P(B') = 0.4$, find:

a) $P(B)$ (2 marks)

b) $P(A)$ (3 marks)

QUESTION 5

There are five measurements of distances (in millimeters) between the pupils of adult patients being fitted for eyeglasses. Random samples of size 2 are drawn without replacement.

67	66	59	62	63

a) Compute the population mean, μ and standard deviation, σ. (4 marks)

b) Find the sampling distribution (probability distribution) for the sample $\overline{x}$. (5 marks)

c) Compute the mean, $\mu_{\overline{x}}$ and standard deviation, $\sigma_{\overline{x}}$ of $\overline{x}$. (4 marks)

d) Compare the mean and standard deviation of the sampling distribution $\mu_{\overline{x}}$, $\sigma_{\overline{x}}$ with μ and σ. (2 marks)

QUESTION 6

A New York Times article noted that the mean life span for 35 male symphonies conducted was 73.4 years, in contrast to the mean of 69.5 years for males in the general population. Assuming that the 35 males have life span with a standard deviation of 8.7 years. Use a 0.05 significant level to test the claim that male symphony conductors have a mean life span that is different from 69.5 years.

(10 marks)

QUESTION 7

A recent survey of 4276 randomly selected households showed that 4019 of them had telephones. Use those survey results to test the claim that the percentage of household is now greater than the 35% rate that was found in year 1920. Use $\alpha = 0.01$ to conduct hypothesis test. (10 marks)

QUESTION 8

The following table shows the density for the discrete random variable X , the number of ships to arrive at a harbor on any given day.

x	10	11	12	13	14
$P(X=x)$	0.4	0.2	k	0.1	0.1

Find:

a) The value of k (3 marks)

b) $P(X \leq 11)$ (2 marks)

c) $P(X > 12)$ (2 marks)

d) $V(X)$ (5 marks)

QUESTION 9

According to the Federal Highway Administration, nearly 30% of U.S drivers are females. Assume a random sample of 50 drivers is to be selected for survey. Find the probability:

a) More than 2 of the drivers will be female using Binomial distribution. (4 marks)

b) Exactly 10 of the drivers will be female using the Normal approximation to the Binomial distribution. (4 marks)

QUESTION 10

Domino sugar packets are labeled as containing 3.5 g. Assume that those packets are actually filled with amounts that are normally distributed with a mean of 3.586 g and a standard deviation of 0.074 g. What is the probability that a sugar packet will have:

a) At most 3.5 g? (4 marks)

b) At least 3.7 g? (4 marks)

c) Between 3.4 g and 3.6 g? (4 marks)

----------End of questions----------

FORMULA

Range=Largest value-smallest value Range=Upper limit of the last class - lower limit of the first class	Midpoint, $x = \dfrac{\text{Lower limit} + \text{Upper limit}}{2}$
$\bar{x} = \dfrac{\sum_{i=1}^{n} x_i}{n}$	$\bar{x} = \dfrac{\sum_{i=1}^{n} f_i x_i}{\sum_{i=1}^{n} f_i}$
$Median, \tilde{x} = L_m + \left(\dfrac{\frac{\sum f}{2} - \sum f_{m-1}}{f_m} \right) \times C_m$ L_m = Lower bound of median class f_m = Frequency of median class $\sum f_{m-1}$ = Cumulative frequency before median class C_m = Size of median class $\sum f$ = Number of observation /total frequency	$Mode, \hat{x} = L_{mo} + \left(\dfrac{d_1}{d_1 + d_2} \right) \cdot C_{mo}$ L_{mo} = Lower bound of modal class d_1 = Difference between modal class frequency and the previous class frequency. d_2 = Difference between modal class frequency and the next class frequency. C_{mo} = Size of modal class
$s^2 = \dfrac{1}{\sum f - 1} \left(\sum f_i x_i^2 - \dfrac{\left(\sum f_i x_i \right)^2}{\sum f} \right)$ $s = \sqrt{s^2}$	$Skewness = \dfrac{mean - \text{mod}\, e}{s \tan dard\ deviation}$ or $Skewness = \dfrac{3(mean - median)}{s \tan dard\ deviation}$
Interquartile Range, $IQR = Q_3 - Q_1$ which the first quartile lies. $Q_1 = L_{Q1} + \left[\dfrac{\frac{1}{4}N - F_{Q1}}{f_{Q1}} \right] \times C$ $Q_3 = L_{Q3} + \left[\dfrac{\frac{3}{4}N - F_{Q3}}{f_{Q3}} \right] \times C$ L_{Q1} = lower bound of the class in which the first quartile lies. N = total frequency. F_{Q1} = the cummulative frequency before the class in which first quartile lies. f_{Q1} = the frequency of the class in which the first quartile lies.	
$P(A) = \dfrac{n(A)}{n(S)}$	$P(A \mid B) = \dfrac{P(A \cap B)}{P(B)}$
$P(A \cup B) = P(A) + P(B) - P(A \cap B)$	$P(A \cap B) = P(B).P(A)$

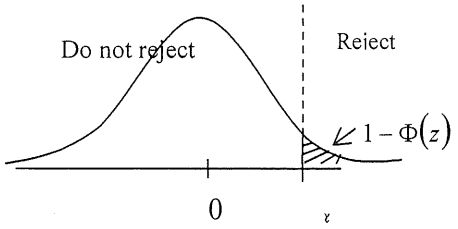
$P(A \mid B) = \dfrac{P(A) \cdot P(B \mid A)}{P(A) \cdot P(B \mid A) + P(A') \cdot P(B \mid A')}$	$\mu = \dfrac{\sum x}{N}$ $\mu_{\bar{x}} = \sum \bar{x} P(\bar{x})$
$\sigma = \sqrt{\dfrac{\sum (x_i - \mu)^2}{N}}$ $\quad {}^{N}C_{n}$ $\quad N^{n}$ $\sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}} \sqrt{\dfrac{N-n}{N-1}}$ $\quad \sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}}$	$Z = \dfrac{\bar{x} - \mu_0}{s/\sqrt{n}}$ $\quad T = \dfrac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$
$Z = \dfrac{\hat{p} - p_0}{\sqrt{\dfrac{p_0(1-p_0)}{n}}}$ $\quad Z = \dfrac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}}$	$f(x) = P(X = x) = \binom{n}{x} p^x q^{n-x}$
$f(x) = P(X = x) = \dfrac{\lambda^x e^{-\lambda}}{x!}$	$\mu = E(X) = \sum_{-\infty}^{\infty} x \cdot f(x) = \int_{-\infty}^{\infty} x \cdot f(x)\, dx$
$E(X^2) = \sum_{-\infty}^{\infty} x^2 \cdot f(x) = \int_{-\infty}^{\infty} x^2 \cdot f(x)\, dx$ $Var(X) = E(X^2) - [E(X)]^2$	$Z = \dfrac{X - \mu}{\sigma}$ $\quad Z = \dfrac{X - np}{\sqrt{npq}}$ $\quad Z = \dfrac{X - \lambda}{\sqrt{\lambda}}$

APPENDIX I

Table I Standard Normal Distribution

$$1-\Phi(z)=P(Z>z)=\frac{1}{\sqrt{2\pi}}\int_{z}^{\infty}e^{-z^2/2}dz$$

$$z=\frac{x-\mu}{\sigma}$$



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
3.7	.000108	.000104	.000100	.000096	.000092	.000088	.000085	.000082	.000078	.000075
3.8	.000072	.000069	.000067	.000064	.000062	.000059	.000057	.000054	.000052	.000050
3.9	.000048	.000046	.000044	.000042	.000041	.000039	.000037	.000036	.000034	.000033
4.0	.000032									

5.0 → 0.0000002867 5.5 → 0.0000000190 6.0 → 0.0000000010