

KATHMANDU UNIVERSITY
End Semester Examination [C]
January, 2019

Marks scored:

Level : B.Sc.\B. Pharm.\B. Tech.
Year : I

Course : MATH 102
Semester: II

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : JAN 02 2019

SECTION "A"
[10 Q. × 1=10 marks]

Fill in the blank space (s) by writing the most appropriate word(s) or symbol(s).

1. The relative frequency multiplied by 100 is called
2. The ratio of the standard deviation to the arithmetic mean expressed as a percentage is called
3. For a frequency distribution, if "Mean \leq Median \leq Mode" then its is negative.
4. If A and B are mutually exclusive events, $P(A) = 0.26$, and $P(B) = 0.45$, then $P(A^c \cap B^c)$ is
5. Suppose a finite population has 6 items and 2 items are selected at random without replacement, then all possible samples will be
6. If a discrete random variable has the probability function as,
x: 0 1 2 3 4 5 6 7 8
p(x): a 3a 5a 7a 9a 11a 13a 15a 17a
then the value of a
7. The probability density function of the standard normal distribution is
8. If the null hypothesis is $H_0: \mu = 25$ and the alternative hypothesis is $H_1: \mu > 25$, then this kind of alternative hypothesis test indicates.....
9. If the population standard deviation σ is known and the sample size n is equal to 15, the confidence interval for the population mean μ is
10. In a regression line where the sum of the square of deviations of the scatter points from the line is

KATHMANDU UNIVERSITY
End Semester examination [C]
January, 2019

Level : B.Sc.\B. Pharm.\B. Tech.
Year : I
Time : 2 hrs. 30 mins.

JAN 02 2019

Course : MATH 102
Semester: II
F. M. : 55

SECTION "C"
[3 Q.×7=21 marks]

1. The manager of Kathmandu University Canteen received complains that the students have to wait too long in the lounge after they arrive at the Canteen and before they are actually served MO:MO. The manger believes that on an average the students should not have wait for more than 30 minutes. He selected a random sample of 50 students and kept track of their waiting time. The following data were recorded. With the waiting time measured in minutes:

29	40	25	31	60	68	39	42	60	43
28	52	30	32	48	17	40	21	32	30
21	72	22	29	19	43	43	36	50	32
43	41	34	45	47	23	48	24	31	35
24	23	19	24	54	56	56	65	47	39

- i) Construct a stem-and-leaf display for this data.
- ii) Construct a frequency distribution for these data with ten class interval, having classes 10-20, 20-30, and so on.
- iii) Construct a histogram for this data.
- iv) Compute coefficient of quartile deviation. [2+2+1+2]

OR

What is Conditional Probability of two Events A and B. State the Bayes' theorem.

A consulting firm rents cars from agencies, 20% from agency D, 20% from agency E, and 60% from agency F. If 10% of the cars from D, 12% of the cars from E, and 4% of the cars from F have bad tires, what is the probability that the firm will get a car with bad tires? Also, find the probability that a car with bad tires rented by the firm came from agency F? [3+4]

2. Write down the assumptions underlying for comparison of two independent large samples from the same populations. Construct a 95% confidence interval for the difference between two populations means.

The following are the number of sales which a sample of 9 salespeople of industrial chemicals in Chitwan and a sample of 6 salespeople of industrial chemicals in Biratnagar made over a certain fixed period of time

Chitwan:	59	68	44	71	63	46	69	54	48
Biratnagar:	50	36	62	52	70	41			

Assuming that the populations sampled can be approximated closely with normal distributions having the same variance, test the null hypothesis $\mu_1 - \mu_2 = 0$ against the alternative hypothesis $\mu_1 - \mu_2 \neq 0$ at the 0.01 level of significance. [3+4]

3. Raw material used in the production of a synthetic fiber is stored in a place which has no humidity control. Measurements of the relative humidity in the storage place and the moisture content of a sample of the raw material (both in percentage) on 10 days yielded the following results:

Humidity x	42	35	50	43	48	62	31	36	44	39
Moisture content y	12	8	14	9	11	16	7	9	12	10

- (a) Plot the data on a scatter diagram to verify that it is assume that the regression of Y on X is linear
 (b) Fit a straight line to these data by the method of least squares. [3+4]

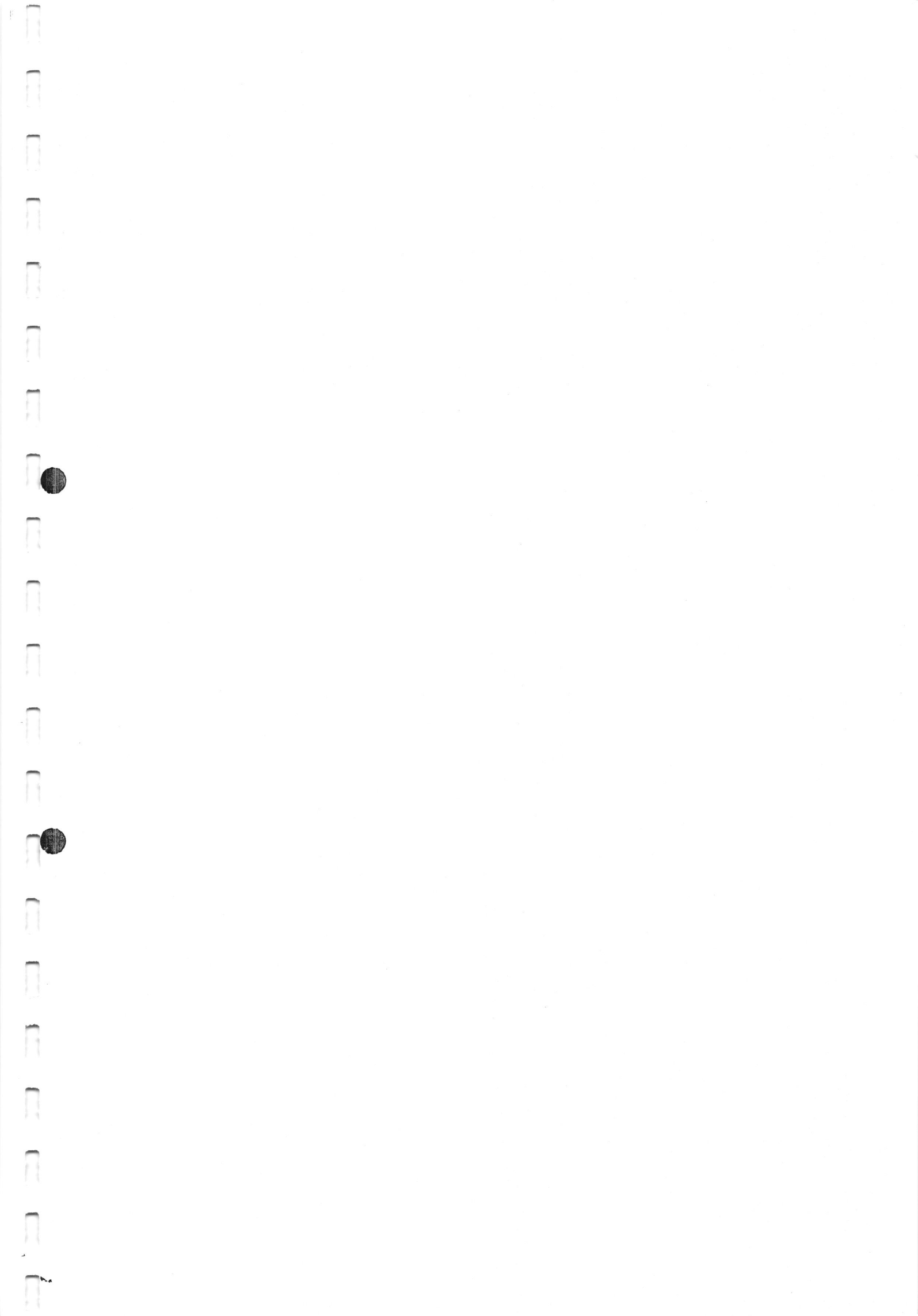
SECTION "D"

[6 Q.×4=24 marks]

4. If the probability density of a random variable is given by
- $$f(x) = \begin{cases} x, & 0 < x < 1, \\ 2 - x, & 1 \leq x < 2, \\ 0, & \text{elsewhere.} \end{cases}$$
- find the probabilities that a random variable having this probability density will take on a value (a) between 0.2 and 0.8; (b) between 0.6 and 1.2
5. Suppose that the probabilities are 0.4, 0.3, 0.2 and 0.1 that there will be 0, 1, 2, or 3 power failures in a certain city during the month of July. Find the mean and variance of this probability distribution.
6. If a random variable has the binomial distribution with $n = 40$ and $p = 0.40$, use the normal approximation to determine the probabilities that it will take on (a) the value 22; (b) a value less than 8.
7. The mean of a random sample of size $n = 25$ is used to estimate the mean of an infinite population that has standard deviation $\sigma = 2.4$. What can we assert about the probability that the error will be less than 1.2, if we use (i) Chebyshev's theorem; (ii) the central limit theorem.
8. A research worker wants to determine the average time it takes a machine to rotate the tires of a car, and she want to be able to assert with 95% confidence that mean of her sample is off by at most 0.5 minute. If she can presume from the past experiment that $\sigma = 1.6$ minutes, how large a sample will she have to take?
9. If the mean age at death of 64 men engaged in an occupation is 52.4 years with standard deviation of 10.2 years. What are the 90% confidence limits for the mean age of all men in that population?

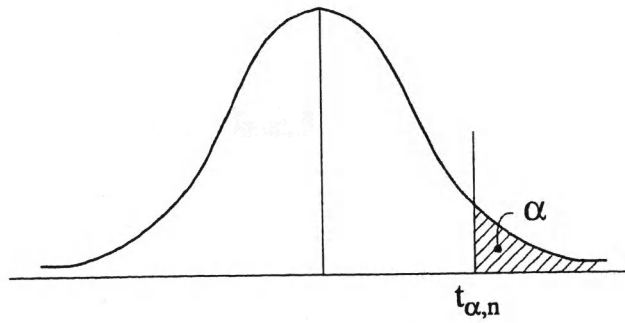
SECTION "E"
[5Q. × 2 = 10 marks]

10. Accidents at a potato-chip plant are categorized according to the area injured
- | | |
|---------|----|
| fingers | 17 |
| eyes | 5 |
| arm | 2 |
| leg | 1 |
- Make a Pareto chart.
11. When we sample from an infinite population, what happen to the standard error of the mean if the sample size is decreased from 360 to 90?
12. A shipment of 20 tape recorders contains 5 that are defective. If 10 of them are randomly chosen for inspection, what is the probability that 2 of the 10 will be defective?
13. Explain why there must be a mistake in each of the following statements:
- (a) The probability that a mineral sample will contain silver is 0.38 and the probability that it will not contain silver is 0.52
 - (b) The probability that a drilling operation will be a success is 0.34 and the probability that it will not be a success is -0.66.
14. If 5% of the electric bulbs manufactured by a company are defective. Use Poisson distribution to find the probability that in a sample of 100 bulbs; 5 bulbs will be defective?



STUDENT'S *t*-DISTRIBUTION

JAN 02 2019



VALUES OF $t_{\alpha, n}$

<i>df</i>	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	<i>df</i>
1	1.000	1.376	1.963	3.078	6.314	12.706	31.821	63.657	1
2	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	2
3	0.765	0.978	1.350	1.638	2.353	3.182	4.541	5.841	3
4	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	4
5	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5
6	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	6
7	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	7
8	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	8
9	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	9
10	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	10
11	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	11
12	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	12
13	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	13
14	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	14
15	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	15
16	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	16
17	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	17
18	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	18
19	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	19
20	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	20
21	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	21
22	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	22
23	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	23
24	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	24
25	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	25
26	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	26
27	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	27
28	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	28
29	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	29
30	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	30
∞	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	∞

