KATHMANDU UNIVERSITY
End Semester Examination [C]
January, 2018

Marks Scored:

Level : B.E./B.Sc./B.Tech.
Year : II

Course : MATH 208
Semester: I & II

Exam. Roll No.:

Time: 30 mins.

F. M. : 20

Registration No.:

Date JAN 0 8 2018

SECTION "A"
[10 Q.×1=10 marks]

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

1. When we are concerned with one of the variable having a class interval associated with the corresponding frequency distribution, then it is often called _____

2. A _____ is the ratio of a number of observation to the total number of observation of the given discrete or continuous frequency distribution

3. The box encloses the interquartile range with the left line at the first quartile and the right line at the _____

4. The total of all the possible outcome of an any trial, we can describe the _____

5. If the intersections for all combinations of two or more events among K events considered are empty, then K events are said to be _____

6. The total probability of an event must be equal to _____

7. If the units on the standard deviation is say centimeter, then the units on the variance would be _____

8. In the given data set, 1, 9, 3, 6, and 8 then the coefficient of Range of value would be _____

9. When we are concerned with the functional relationship between the dependent variable and only one independent variable then that functional relationship between these two variables are often called _____

10. The Choice of a particular graph depends upon _____

SECTION "B"
[10 Q.×1=10 marks]

11. Rows are typically assigned to units observed, and columns present numerical data is called _____
    a) an array, b) tabulation of data,
    c) presentation of data d) classification of data

12. Which of the following is based on all the observations:
    a) Range, b) Quartile deviation, c) mode d) Arithmetic mean

13. The second quartile signifies _____
    a) Middle 50 percent of the data observations, b) All the data observation,
    c) First 25 percent of the data observations d) last 25 percent of the data observations

14. The mean of Binomial distribution is _____
    a) n i.e. the number of trial,
    b) p i.e. probability of success,
    c) q i.e. the probability of failure
    d) np i.e. product of the number of trial and probability of success

15. The mean for a random variable having Binomial distribution with probability of success 0.4 with the number of trial 10 is _____
    a) 4 b) 6 c) 0.24 d) 2.4

16. In testing of Hypothesis, _____ is to reject a true hypothesis.
    a) Type I error b) Type II error c) Type A error d) Type B error

17. The confidence interval on the ratio of the sample variance to the population variance involves _____
    a) $\chi^2 - distribution$ b) $t - distribution$ c) $F - distribution$ d) $Z - distribution$

18. If the scatter diagram is drawn and no points are scattered and revealed a straight line it is an indication of _____
    a) skewness b) perfect correlation c) no correlation d) symmetrical

19. The coefficient of correlation must lies between _____
    a) 0 to 1 b) -1 to 0 c) -1 to 1 d) 1 to

20. The upper control limit for the c Chart i.e. (Defect) is _____
    a) $\bar{c} + 3\sqrt{\bar{c}}$ b) $\bar{c} - 3\sqrt{\bar{c}}$ c) $c + 3\sqrt{c}$ d) $c - 3\sqrt{c}$

KATHMANDU UNIVERSITY
End Semester Examination [C]
January, 2018

JAN 0 8 2018

Level : B.E./B.Sc./B.Tech.
Year : II
Time : 2 hrs. 30 mins.

Course : MATH 208
Semester: I & II
F.M. : 55

SECTION "C"
[3 Q.×7=21 marks]

1. What do you mean by Mean, Median and Mode? What information would Mean, Median and Mode provide for us? [3+4]

The following data represents the length of life in years, measured to the nearest tenths of 30 similar fuel pumps:

17	20	10	39	23	13
12	14	6	9	13	31
16	18	8	13	42	32
13	7	18	51	10	54
7	10	5	14	15	10

a) Construct a stem-and-leaf plot.
b) Construct a frequency distribution for these data with ten class interval, having classes 10-20, 20-30, and so on
c) Set up relative frequency distribution.
d) Set up percentage of relative frequency distribution

2. State the general addition rule of probability. What is its form if concerned events are mutually exclusively? [3+4]

An explosion in LPG storage tank in the process of being repaired could have occurred as the result of Static Electricity (SE), Malfunctioning electrical Equipment (MEE), an Open Flame in Contact with the Liner (OFCL), or Purposeful Action (PA) (industrial sabotage). Interviews with engineers who were analyzing the risks involved led to estimates that such as explosion would occur with probability 0.25 as a result of SE, 0.20 as a result of MEE, 0.40 as a result of OFCL and 0.75 as a result of PA. These interviews allow yielded subjective estimates of the prior probabilities of these four causes of 0.30, 0.40, 0.15 and 0.15 respectively.

a) What is the probability of explosion in an LPG storage tank?
b) What is the probability that an explosion occurred in an LPG storage tank caused by Purposeful Action (PA)?

OR

What do you meant by dependent and independent probability for two given events? Illustrate with a suitable example? [3+4]

The coordinator of Bachelor in Statistics (B.Stat.) has two secretaries, Nina and Ranu. The probability that Nina will be absent on day is 0.09. The probability that Renu will be absent on any given day is 0.05. The probability that both secretaries will be absent on any given day is 0.02.

a) Find the probability that only Nina will be absent on any given day.
b) Find the probability that either one of them will be absent on any given day.

3. What are the linear regression coefficients? [2+5]

A chemical company, wishing to study the effect of extraction time on the efficiency of an extraction operation, obtained the data shown in the following table:

Extraction Time (minutes) X	Extraction Efficiency Y
1	1.0
2	4.0
3	3.0
4	8.0
5	9.0

a) Draw a scatter plot to verify that a straight line will provide a good fit to the data, draw a straight line by eye, and use it to predict the Extraction Efficiency Y one can expect when the Extraction Time (minutes) X is 3.5.

b) Obtain the line of regression fits of a straight line of Extraction Efficiency Y to Extraction Time (minutes) X.

SECTION "D"

[6Q.×4= 24 marks]

4. An experiment has four possible mutually exclusively outcomes A, B, C and D. Check whether the following assignments of probability are permissible:

a) P(A)= 0.3,P(B)= 0.4,P(C)= 0.11,P(D)= 0.19
b) P(A)= 0.32,P(B)= 0.27,P(C)= -0.04,P(D)= 0.45
c) P(A)= 0.25,P(B)= 0.26,P(C)= 0.20,P(D)= 0.30
d) P(A)= 5/18,P(B)= 1/6,P(C)= 1/3,P(D)= 2/9

5. A random variable X has the following probability distribution:

x:	-2	-1	0	1	2	3
f(x):	0.1	0.3	0.2	0.08	0.13	0.19

a. Sketch the distribution function(CDF)
b. Compute the mean.

OR

Consider the following probability density function:

$$f(x)=\begin{cases}\frac{x}{4} & 0\le x<2\\ (1-\frac{x}{4}), & 2\le x\le 4\\ 0 & \textit{otherwise.}\end{cases}$$

a. Find the cumulative distribution function (CDF).
b. Compute the mean.

6. a) Assume Z has a standard normal distribution. Determine the following probabilities for the standard normal random variable Z:

(i) $P(|Z|\ge 1.5)$ ii) $P0\le Z\le 2)$

b) Assume Z has a standard normal distribution. Determine the value for c that makes the probability statement true

(i) $P(|Z|\le c)=0.99$ ii) $P(Z\le c)=0.94062$

7. The dean of school of science, Kathmandu University, wants to use the mean of a random sample to estimate the average amount of time students take to get from one class to the next and he wants to be able to assert wit 99% confidence that the error is at most 0.19 minutes. If it can be presumed from experience that $\sigma = 1.38$ minutes, how large a sample will he have to take?

8. A sample of two types of video display units is testing circuit designs to determine whether they produce equivalent current flow. Development engineering has following data were obtained:

	Type I	Type II
Sample number	15	10
Sample means	24.2	23.9
Sample variance	10	20

Use the 0.01 level of significance to test whether the difference between the means of these two samples is significant. Assume that both the variances are equal.

9. The Kathmandu University Teaching Hospital is starting a quality improvement project on the time to admit a patient using X bar and R Charts. Determine the limits for the X bar and R charts and check to see if there are any out-of-control points.

Sample Number	x1	x2	x3
1	3.3	2.9	3.1
2	3.3	3.1	3.5
3	3.8	3.7	3.9
4	3.0	3.1	3.2
5	3.8	3.7	3.9
6	3.0	3.1	3.2
7	2.9	3.9	3.8
8	2.8	3.3	3.5
9	3.0	3.1	3.3
10	3.3	3.4	3.5
11	3.8	3.7	3.9
12	3.0	3.1	3.2
13	3.8	3.7	3.9
14	3.0	3.1	3.2
15	2.9	3.9	3.8
16	2.8	3.3	3.5
17	3.3	3.1	3.5
18	3.5	3.7	3.3

SECTION "E"

[5Q.×2=10 marks]

10. What is the probability distribution of discrete random variable X that counts the number of heads in two tosses of a coin?
11. If $\emptyset$ is the empty set, then $P(\emptyset) = 0$).
12. The mean of marks in Statistics of 100 students in a class was 75. The mean of marks of 70 girls was 85. Find out the mean marks of boys in the class.
13. The two sample t statistic for testing

$H_0: \mu_1 - \mu_2 = 0$ versus $H_1: \mu_1 - \mu_2 \neq 0$

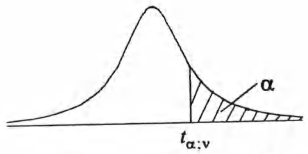
from a sample of n = 18 observation has the value t = 7.113. What are the degrees of statistics?

14. Write a short note on the Parameters.

Table - MATH-208 For Final Exam -

Table of the Student's *t*-distribution

The table gives the values of $t_{\alpha;\nu}$ where $\Pr(T_\nu > t_{\alpha;\nu}) = \alpha$, with ν degrees of freedom



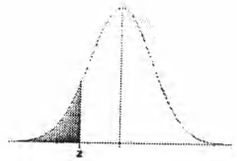
ν \ α	0.1	0.05	0.025	0.01	0.005	0.001	0.0005
1	3.078	6.314	12.076	31.821	63.657	318.310	636.620
2	1.886	2.920	4.303	6.965	9.925	22.326	31.598
3	1.638	2.353	3.182	4.541	5.841	10.213	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	1.319	1.714	2.069	2.500	2.807	3.485	3.767
24	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	1.296	1.671	2.000	2.390	2.660	3.232	3.460
120	1.289	1.658	1.980	2.358	2.617	3.160	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.090	3.291

Factors for Constructing Variables Control Charts

	$\bar{X}$ Chart		R Chart			
	Factors for Control Limits			Factors for Control Limits		
n^a	A_1	A_2	d_2	D_3	D_4	n
2	3.760	1.880	1.128	0	3.267	2
3	2.394	1.023	1.693	0	2.575	3
4	1.880	0.729	2.059	0	2.282	4
5	1.596	0.577	2.326	0	2.115	5
6	1.410	0.483	2.534	0	2.004	6
7	1.277	0.419	2.704	0.076	1.924	7
8	1.175	0.373	2.847	0.136	1.864	8
9	1.094	0.337	2.970	0.184	1.816	9
10	1.028	0.308	3.078	0.223	1.777	10
11	0.973	0.285	3.173	0.256	1.744	11
12	0.925	0.266	3.258	0.284	1.716	12
13	0.884	0.249	3.336	0.308	1.692	13
14	0.848	0.235	3.407	0.329	1.671	14
15	0.816	0.223	3.472	0.348	1.652	15
16	0.788	0.212	3.532	0.364	1.636	16
17	0.762	0.203	3.588	0.379	1.621	17
18	0.738	0.194	3.640	0.392	1.608	18
19	0.717	0.187	3.689	0.404	1.596	19
20	0.697	0.180	3.735	0.414	1.586	20
21	0.679	0.173	3.778	0.425	1.575	21
22	0.662	0.167	3.819	0.434	1.566	22
23	0.647	0.162	3.858	0.443	1.557	23
24	0.632	0.157	3.895	0.452	1.548	24
25	0.619	0.153	3.931	0.459	1.541	25

[a] $n > 25$: $A_1 = 3/\sqrt{n}$ where n = number of observations in sample.

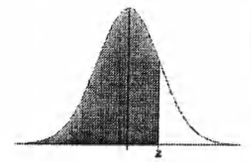
Standard Normal Cumulative Probability Table



Cumulative probabilities for NEGATIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-3.4	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002
-3.3	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003
-3.2	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005
-3.1	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007
-3.0	0.0013	0.0013	0.0013	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010
-2.9	0.0019	0.0018	0.0018	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
-2.8	0.0026	0.0025	0.0024	0.0023	0.0023	0.0022	0.0021	0.0021	0.0020	0.0019
-2.7	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026
-2.6	0.0047	0.0045	0.0044	0.0043	0.0041	0.0040	0.0039	0.0038	0.0037	0.0036
-2.5	0.0062	0.0060	0.0059	0.0057	0.0055	0.0054	0.0052	0.0051	0.0049	0.0048
-2.4	0.0082	0.0080	0.0078	0.0075	0.0073	0.0071	0.0069	0.0068	0.0066	0.0064
-2.3	0.0107	0.0104	0.0102	0.0099	0.0096	0.0094	0.0091	0.0089	0.0087	0.0084
-2.2	0.0139	0.0136	0.0132	0.0129	0.0125	0.0122	0.0119	0.0116	0.0113	0.0110
-2.1	0.0179	0.0174	0.0170	0.0166	0.0162	0.0158	0.0154	0.0150	0.0146	0.0143
-2.0	0.0228	0.0222	0.0217	0.0212	0.0207	0.0202	0.0197	0.0192	0.0188	0.0183
-1.9	0.0287	0.0281	0.0274	0.0268	0.0262	0.0256	0.0250	0.0244	0.0239	0.0233
-1.8	0.0359	0.0351	0.0344	0.0336	0.0329	0.0322	0.0314	0.0307	0.0301	0.0294
-1.7	0.0446	0.0436	0.0427	0.0418	0.0409	0.0401	0.0392	0.0384	0.0375	0.0367
-1.6	0.0548	0.0537	0.0526	0.0516	0.0505	0.0495	0.0485	0.0475	0.0465	0.0455
-1.5	0.0668	0.0655	0.0643	0.0630	0.0618	0.0606	0.0594	0.0582	0.0571	0.0559
-1.4	0.0808	0.0793	0.0778	0.0764	0.0749	0.0735	0.0721	0.0708	0.0694	0.0681
-1.3	0.0968	0.0951	0.0934	0.0918	0.0901	0.0885	0.0869	0.0853	0.0838	0.0823
-1.2	0.1151	0.1131	0.1112	0.1093	0.1075	0.1056	0.1038	0.1020	0.1003	0.0985
-1.1	0.1357	0.1335	0.1314	0.1292	0.1271	0.1251	0.1230	0.1210	0.1190	0.1170
-1.0	0.1587	0.1562	0.1539	0.1515	0.1492	0.1469	0.1446	0.1423	0.1401	0.1379
-0.9	0.1841	0.1814	0.1788	0.1762	0.1736	0.1711	0.1685	0.1660	0.1635	0.1611
-0.8	0.2119	0.2090	0.2061	0.2033	0.2005	0.1977	0.1949	0.1922	0.1894	0.1867
-0.7	0.2420	0.2389	0.2358	0.2327	0.2296	0.2266	0.2236	0.2206	0.2177	0.2148
-0.6	0.2743	0.2709	0.2676	0.2643	0.2611	0.2578	0.2546	0.2514	0.2483	0.2451
-0.5	0.3085	0.3050	0.3015	0.2981	0.2946	0.2912	0.2877	0.2843	0.2810	0.2776
-0.4	0.3446	0.3409	0.3372	0.3336	0.3300	0.3264	0.3228	0.3192	0.3156	0.3121
-0.3	0.3821	0.3783	0.3745	0.3707	0.3669	0.3632	0.3594	0.3557	0.3520	0.3483
-0.2	0.4207	0.4168	0.4129	0.4090	0.4052	0.4013	0.3974	0.3936	0.3897	0.3859
-0.1	0.4602	0.4562	0.4522	0.4483	0.4443	0.4404	0.4364	0.4325	0.4286	0.4247
0.0	0.5000	0.4960	0.4920	0.4880	0.4840	0.4801	0.4761	0.4721	0.4681	0.4641

Standard Normal Cumulative Probability Table



Cumulative probabilities for POSITIVE z-values are shown in the following table:

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
1.0	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
1.1	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
1.2	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
1.3	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
1.4	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
1.5	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9429	0.9441
1.6	0.9452	0.9463	0.9474	0.9484	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
1.7	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
1.8	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9699	0.9706
1.9	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9761	0.9767
2.0	0.9772	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
2.1	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
2.2	0.9861	0.9864	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
2.3	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
2.4	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
2.5	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
2.6	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
2.7	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
2.8	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9979	0.9980	0.9981
2.9	0.9981	0.9982	0.9982	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
3.0	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
3.1	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
3.2	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
3.3	0.9995	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
3.4	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998