

PGDM (IB) (18-20)
Statistics for Business Analysis
IB-101

Trimester – I, End-Term Examination: September 2018

Time allowed: 2 hrs 30 min

Max Marks: 50

Roll No: _____

Instruction: Students are required to write Roll No on every page of the question paper, writing anything except the Roll No will be treated as **Unfair Means**. In case of rough work please use answer sheet.

Sections	No. of Questions to attempt	Marks	Marks
A	3 out of 5 (Short Questions)	5 Marks each	$3 \times 5 = 15$
B	2 out of 3 (Long Questions)	10 Marks each	$2 \times 10 = 20$
C	Compulsory Case Study	15 Marks	15
		Total Marks	50

SECTION A

A1. The daily exchange rate of one dollar in euros during the first three months of 2007 can be inferred to have the following distribution.

x	P(x)
0.73	0.05
0.74	0.10
0.75	0.25
0.76	0.40
0.77	0.15
0.78	0.05

- Show that P(x) is a probability distribution.
- What is the probability that the exchange rate on a given day during this period will be at least 0.75%
- What is the probability that the exchange rate on a given day during this period will be less than 0.77%

A2. 47% of children say that chocolate chip cookie is their favorite kind of cookie. If you randomly select 12 children find the probability that:

- a) At least 10 of them say that chocolate chip cookie is their favorite cookie.
- b) Four of them say that chocolate chip cookie is their favorite cookie.
- c) Find the mean and standard deviation for this sample.

A3. On average, 6 birds hit the Washington Monument and are killed each week. Bill Garcy, an official of the National Parks Services, has requested that congress allocate funds for equipment to scare birds away from the monument. A Congressional subcommittee has replied that funds can not be allocated unless the probability of more than three birds being killed in any week exceeds 0.8. Will the funds be allocated?

A4. A tire company finds the lifespan for one brand of its tires is normally distributed with a mean of 47,500 miles and a standard deviation of 3,000 miles. If the manufacturer is willing to replace no more than 10% of the tires, what should be the approximate number of miles for the warranty?

A5. A random sample of 100 credit sales in a department store showed an average sale of \$120.00. From past data, it is known that the standard deviation of the population is \$40.00.

- a. Determine the standard error of the mean.
- b. With a 0.95 probability, determine the margin of error.
- c. What is the 95% confidence interval of the population mean?

SECTION B

B1. Military radar and missile detection system are designed to warn a country of an enemy attack. A reliability question is whether a detection system will be able to identify an attack and issue a warning. Assume that a particular detection system has a .90 probability of detecting a missile attack. Use the binomial probability distribution to answer the following questions.

- a) What is the probability that a single detection system will detect an attack?
- b) If two detection systems are installed in the same area and operate independently, what is the probability that at least one of the systems will detect the attack?
- c) If three systems are installed, what is the probability that at least one of the systems will detect the attack?
- d) Would you recommend that multiple detection system be used? Explain.

B2. The following data were collected on the height (inches) and weight (pounds) of men swimmers.

Height	68	64	62	65	66
Weight	132	108	102	115	128

- Develop a scatter diagram for these data with height as the independent variable. What does the scatter diagram indicate about the relationship between the two variables?
- Calculate and Interpret the slope of the regression line
- If swimmer's height is 63 inches, what would you estimate her weight to be?

B3. The Manager of an automobile dealership is considering a new bonus plan designed to increase sales volume. Currently, the mean sales volume is 14 automobiles per month. The manager wants to conduct a research study to see whether the new bonus plan increases sales volume. To collect data on the plan, a sample of sales personnel will be allowed to sell under the new bonus plan for a one -month period.

- Develop the null and alternate hypotheses most appropriate for this research situation.
- Comment on the conclusion when H_0 can't be rejected.
- Comment on the conclusion when H_0 can be rejected.

SECTION C

Case # Grahak Anusandhan kendra

Grahak Anusandhan kendra, a consumer research organization, conducts surveys designed to evaluate a wide variety of products and services available to consumers. In one particular study, the company looked at consumer satisfaction with the performance of automobiles produced by a major manufacturer. A questionnaire sent to owners of one of the manufacturer's full-sized cars reviewed several complaints about early transmission problems. Nationwide, the population mean mileage is 80,000 miles, with a population standard deviation of 18,000 miles.

To learn more about the transmission failures, Grahak Anusandhan kendra used a sample of actual transmission repairs provided by a transmission repair firm in the NCR area. The following data show the actual number of miles driven for 50 vehicles at the time of transmission failure.

85092	66998	77437	79294	121352
39323	67202	116803	138114	69922

64342	89341	59817	64090	86813
74276	88798	72069	63436	85586
74425	59465	53500	95774	59902
37831	94219	85288	77098	85861
77539	67998	32534	64544	69568
32609	40001	92857	53402	35662
89641	118444	101769	32464	116269
61978	73341	25066	65605	82256

For the sample, descriptive statistics are :

	n	MEAN	STDEV	SE	MIN	MAX
MILES	50	73340	24899	3521	25066	138114

Prepare a managerial report summarizing the results of the survey. Your report should address the following issue.

1. At 95% confidence, what is the margin of error? What is the 95% confidence interval estimate of the population mean? Clearly state your conclusions based on this information.
2. What would happen to the confidence interval if you increased the sample size to 200? Why? What are the new margin of error and confidence interval?
3. Use hypothesis testing to determine whether the sample data support the conclusion that the mean mileage of vehicles produced by this manufacturer is lower than the national average mileage at transmission failure. Be sure to clearly state your hypotheses. Include the test statistic, rejection rule, and conclusions in your answer.

Some important Formulae

$$P(x) = \binom{n}{x} p^x q^{(n-x)} = \frac{n!}{x!(n-x)!} p^x q^{(n-x)} \quad ; \mu = np \quad ; \sigma^2 = npq$$

$$P(x) = \frac{\mu^x e^{-\mu}}{x!} \text{ for } x = 1, 2, 3, \dots \quad ; \quad z = \frac{x - \mu}{\sigma}$$

$$\frac{\bar{X} - \mu}{\sigma/\sqrt{n}} \qquad \frac{\bar{X} - \mu}{s/\sqrt{n}} \qquad \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$$

$$\frac{\bar{X} - \mu_0}{\sigma/\sqrt{n}} \qquad \frac{\bar{X} - \mu_0}{s/\sqrt{n}} \qquad \frac{(\hat{p} - p_0)}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

$$\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \qquad \bar{X} \pm t_{(\frac{\alpha}{2}, n-1)} \frac{s}{\sqrt{n}} \qquad n = \frac{(z_{\alpha/2})^2 \sigma^2}{E^2}$$

Finite Correction Factor : $\sqrt{\frac{N-n}{N-1}}$

$$N\bar{X} \pm N (t_{\alpha/2, n-1}) \frac{s}{\sqrt{n}} \sqrt{\frac{(N-n)}{(N-1)}}$$

$$Y_i = b_0 + b_1 X$$

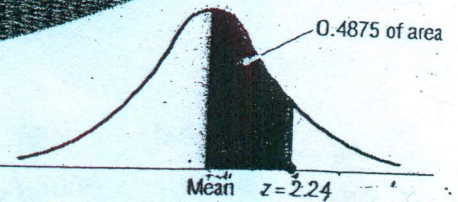
$$b_0 = \bar{y} - b_1 \bar{x}$$

$$b_1 = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$$

$$b_1 = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$

Appendix Tables

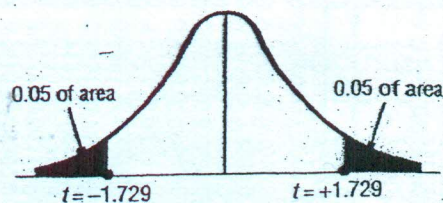
EXAMPLE: TO FIND THE AREA UNDER THE CURVE BETWEEN THE MEAN AND A POINT 2.24 STANDARD DEVIATIONS TO THE RIGHT OF THE MEAN, LOOK UP THE VALUE OPPOSITE 2.2 AND UNDER 0.04 IN THE TABLE; 0.4875 OF THE AREA UNDER THE CURVE LIES BETWEEN THE MEAN AND A z VALUE OF 2.24.



APPENDIX TABLE 1 AREAS UNDER THE STANDARD NORMAL PROBABILITY DISTRIBUTION BETWEEN THE MEAN AND POSITIVE VALUES OF z

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0199	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2967	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3531	0.3554	0.3577	0.3599	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990

EXAMPLE: TO FIND THE VALUE OF t THAT CORRESPONDS TO AN AREA OF 0.10 IN BOTH TAILS OF THE DISTRIBUTION COMBINED, WHEN THERE ARE 19 DEGREES OF FREEDOM, LOOK UNDER THE 0.10 COLUMN, AND PROCEED DOWN TO THE 19 DEGREES OF FREEDOM ROW; THE APPROPRIATE t VALUE THERE IS 1.729.



APPENDIX TABLE 2 AREAS IN BOTH TAILS COMBINED FOR STUDENT'S t DISTRIBUTION

Degrees of Freedom	Area in Both Tails Combined			
	0.10	0.05	0.02	0.01
1	6.314	12.706	31.821	63.657
2	2.920	4.303	6.965	9.925
3	2.353	3.182	4.541	5.841
4	2.132	2.776	3.747	4.604
5	2.015	2.571	3.365	4.032
6	1.943	2.447	3.143	3.707
7	1.895	2.365	2.998	3.499
8	1.860	2.306	2.896	3.355
9	1.833	2.262	2.821	3.250
10	1.812	2.228	2.764	3.169
11	1.796	2.201	2.718	3.106
12	1.782	2.179	2.681	3.055
13	1.771	2.160	2.650	3.012
14	1.761	2.145	2.624	2.977
15	1.753	2.131	2.602	2.947
16	1.746	2.120	2.583	2.921
17	1.740	2.110	2.567	2.898
18	1.734	2.101	2.552	2.878
19	1.729	2.093	2.539	2.861
20	1.725	2.086	2.528	2.845
21	1.721	2.080	2.518	2.831
22	1.717	2.074	2.508	2.819
23	1.714	2.069	2.500	2.807
24	1.711	2.064	2.492	2.797
25	1.708	2.060	2.485	2.787
26	1.706	2.056	2.479	2.779
27	1.703	2.052	2.473	2.771
28	0.701	2.048	2.467	2.763
29	1.699	2.045	2.462	2.756
30	1.697	2.042	2.457	2.750
40	1.684	2.021	2.423	2.704
60	1.671	2.000	2.390	2.660
120	1.658	1.980	2.358	2.617
Normal Distribution	1.645	1.960	2.326	2.576

n	r	0.37	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.45	0.46	0.47	0.48	0.49	0.50	r	n
12	0	0.0039	0.0032	0.0027	0.0022	0.0018	0.0014	0.0012	0.0010	0.0008	0.0006	0.0005	0.0004	0.0003	0.0002	12	12
1	1	0.0276	0.0237	0.0204	0.0174	0.0148	0.0126	0.0106	0.0090	0.0075	0.0063	0.0052	0.0043	0.0036	0.0029	11	11
2	2	0.0890	0.0800	0.0716	0.0639	0.0567	0.0502	0.0442	0.0388	0.0339	0.0294	0.0255	0.0220	0.0189	0.0161	10	10
3	3	0.1742	0.1634	0.1526	0.1419	0.1314	0.1211	0.1111	0.1015	0.0923	0.0836	0.0754	0.0676	0.0604	0.0537	9	9
4	4	0.2302	0.2210	0.2195	0.2128	0.2054	0.1973	0.1886	0.1794	0.1700	0.1602	0.1502	0.1405	0.1306	0.1208	8	8
5	5	0.2163	0.2210	0.2246	0.2270	0.2284	0.2285	0.2276	0.2256	0.2225	0.2184	0.2134	0.2075	0.2008	0.1934	7	7
6	6	0.1482	0.1580	0.1675	0.1766	0.1851	0.1931	0.2003	0.2068	0.2124	0.2171	0.2208	0.2234	0.2250	0.2256	6	6
7	7	0.0746	0.0830	0.0918	0.1009	0.1103	0.1198	0.1295	0.1393	0.1489	0.1585	0.1678	0.1768	0.1853	0.1934	5	5
8	8	0.0274	0.0318	0.0367	0.0420	0.0479	0.0542	0.0611	0.0684	0.0762	0.0844	0.0930	0.1020	0.1113	0.1208	4	4
9	9	0.0071	0.0087	0.0104	0.0125	0.0148	0.0175	0.0205	0.0239	0.0277	0.0319	0.0367	0.0418	0.0475	0.0537	3	3
10	10	0.0013	0.0016	0.0020	0.0025	0.0031	0.0038	0.0046	0.0056	0.0068	0.0082	0.0098	0.0116	0.0137	0.0161	2	2
11	11	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	0.0006	0.0008	0.0010	0.0013	0.0016	0.0019	0.0024	0.0029	1	1
12	12	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0	12
15	0	0.0010	0.0008	0.0006	0.0005	0.0004	0.0003	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	15	15
1	1	0.0086	0.0071	0.0058	0.0047	0.0038	0.0031	0.0025	0.0020	0.0016	0.0012	0.0010	0.0008	0.0006	0.0005	14	14
2	2	0.0354	0.0303	0.0259	0.0219	0.0185	0.0156	0.0130	0.108	0.0090	0.0074	0.0060	0.0049	0.0040	0.0032	13	13
3	3	0.0901	0.0805	0.0716	0.0634	0.0558	0.0489	0.0426	0.0369	0.0318	0.0272	0.0232	0.0197	0.0166	0.0139	12	12
4	4	0.1587	0.1481	0.1374	0.1268	0.1163	0.1061	0.0963	0.0869	0.0780	0.0696	0.0617	0.0545	0.0478	0.0417	11	11
5	5	0.2051	0.1997	0.1933	0.1859	0.1778	0.1691	0.1598	0.1502	0.1404	0.1304	0.1204	0.1106	0.1010	0.0916	10	10
6	6	0.2008	0.2040	0.2066	0.2066	0.2060	0.2041	0.2010	0.1967	0.1914	0.1851	0.1780	0.1702	0.1617	0.1527	9	9
7	7	0.1516	0.1608	0.1693	0.1771	0.1840	0.1900	0.1949	0.1987	0.2013	0.2028	0.2030	0.2020	0.1997	0.1964	8	8
8	8	0.0890	0.0985	0.1082	0.1181	0.1279	0.1376	0.1470	0.1561	0.1647	0.1727	0.1800	0.1864	0.1919	0.1964	7	7
9	9	0.0407	0.0470	0.0538	0.0612	0.0691	0.0775	0.0863	0.0954	0.1048	0.1144	0.1241	0.1338	0.1434	0.1527	6	6
10	10	0.0143	0.0173	0.0206	0.0245	0.0288	0.0337	0.0390	0.0450	0.0515	0.0585	0.0661	0.0741	0.0827	0.0916	5	5
11	11	0.0038	0.0048	0.0060	0.0074	0.0091	0.0111	0.0134	0.0161	0.0191	0.0226	0.0266	0.0311	0.0361	0.0417	4	4
12	12	0.0007	0.0010	0.0013	0.0016	0.0021	0.0027	0.0034	0.0042	0.0052	0.0064	0.0079	0.0096	0.0116	0.0139	3	3
13	13	0.0001	0.0001	0.0002	0.0003	0.0003	0.0004	0.0006	0.0008	0.0010	0.0013	0.0016	0.0020	0.0026	0.0032	2	2
14	14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0004	0.0005	1	1
15	15	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	15
20	0	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	20	20
1	1	0.0011	0.0009	0.0007	0.0005	0.0004	0.0003	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	19	19
2	2	0.0064	0.0050	0.0040	0.0031	0.0024	0.0018	0.0014	0.0011	0.0008	0.0006	0.0005	0.0003	0.0002	0.0002	18	18
3	3	0.0224	0.0185	0.0152	0.0123	0.0100	0.0080	0.0064	0.0051	0.0040	0.0031	0.0024	0.0019	0.0014	0.0011	17	17
4	4	0.0559	0.0482	0.0412	0.0350	0.0295	0.0247	0.0206	0.0170	0.0139	0.0113	0.0092	0.0074	0.0059	0.0046	16	16
5	5	0.1051	0.0945	0.0843	0.0746	0.0656	0.0573	0.0496	0.0427	0.0365	0.0309	0.0260	0.0217	0.0180	0.0148	15	15
6	6	0.1543	0.1447	0.1347	0.1244	0.1140	0.1037	0.0936	0.0839	0.0746	0.0658	0.0577	0.0501	0.0432	0.0370	14	14
7	7	0.1812	0.1774	0.1722	0.1659	0.1585	0.1502	0.1413	0.1318	0.1221	0.1122	0.1023	0.0925	0.0830	0.0739	13	13
8	8	0.1730	0.1767	0.1790	0.1797	0.1790	0.1768	0.1732	0.1683	0.1623	0.1553	0.1474	0.1388	0.1296	0.1201	12	12
9	9	0.1354	0.1444	0.1526	0.1597	0.1658	0.1707	0.1742	0.1763	0.1771	0.1763	0.1742	0.1708	0.1661	0.1602	11	11
10	10	0.0875	0.0974	0.1073	0.1171	0.1268	0.1359	0.1446	0.1524	0.1593	0.1652	0.1700	0.1734	0.1755	0.1762	10	10
11	11	0.0467	0.0542	0.0624	0.0710	0.0801	0.0895	0.0991	0.1089	0.1185	0.1280	0.1370	0.1455	0.1533	0.1602	9	9
12	12	0.0206	0.0249	0.0299	0.0355	0.0417	0.0486	0.0561	0.0642	0.0727	0.0818	0.0911	0.1007	0.1103	0.1201	8	8
13	13	0.0074	0.0094	0.0118	0.0146	0.0178	0.0217	0.0260	0.0310	0.0366	0.0429	0.0497	0.0572	0.0653	0.0739	7	7
14	14	0.0022	0.0029	0.0038	0.0049	0.0062	0.0078	0.0098	0.0122	0.0150	0.0183	0.0221	0.0264	0.0314	0.0370	6	6
15	15	0.0005	0.0007	0.0010	0.0013	0.0017	0.0023	0.0030	0.0038	0.0049	0.0062	0.0078	0.0098	0.0121	0.0148	5	5
16	16	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0007	0.0009	0.0013	0.0017	0.0022	0.0028	0.0036	0.0046	4	4
17	17	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0005	0.0006	0.0008	0.0011	3	3
18	18	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	2	2
20	20	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1	1

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APPENDIX TABLE 3 BIONOMIAL PROBABILITIES

FOR A GIVEN COMBINATION OF n AND p , ENTRY INDICATES THE PROBABILITY OF OBTAINING A SPECIFIED VALUE OF r . TO LOCATE ENTRY: WHEN $p \leq 0.50$, READ p ACROSS THE TOP AND BOTH n AND r DOWN THE LEFT MARGIN; WHEN $p \geq 0.50$, READ p ACROSS THE BOTTOM AND BOTH n AND r UP THE RIGHT MARGIN.

		p																				
n	r	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	r		
		0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	1		
2	0	0.9801	0.9604	0.9409	0.9216	0.9025	0.8836	0.8649	0.8464	0.8281	0.8100	0.7921	0.7744	0.7569	0.7396	0.7225	0.7056	0.6889	0.6724	2	2	
	1	0.0198	0.0392	0.0582	0.0768	0.0950	0.1128	0.1302	0.1472	0.1638	0.1800	0.1958	0.2112	0.2262	0.2408	0.2550	0.2688	0.2822	0.2952	1	1	
	2	0.0001	0.0004	0.0009	0.0016	0.0025	0.0036	0.0049	0.0064	0.0081	0.0100	0.0121	0.0144	0.0169	0.0196	0.0225	0.0256	0.0289	0.0324	0	2	
3	0	0.9703	0.9412	0.9127	0.8847	0.8574	0.8306	0.8044	0.7787	0.7536	0.7290	0.7050	0.6815	0.6585	0.6361	0.6141	0.5927	0.5718	0.5514	3	3	
	1	0.0294	0.0576	0.0847	0.1106	0.1354	0.1590	0.1816	0.2031	0.2236	0.2430	0.2614	0.2788	0.2952	0.3106	0.3251	0.3387	0.3513	0.3631	2	2	
	2	0.0003	0.0012	0.0026	0.0046	0.0071	0.0102	0.0137	0.0177	0.0221	0.0270	0.0323	0.0380	0.0441	0.0506	0.0574	0.0645	0.0720	0.0797	1	1	
	3	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002	0.0003	0.0005	0.0007	0.0010	0.0013	0.0017	0.0022	0.0027	0.0034	0.0041	0.0049	0.0058	0	3	
4	0	0.9606	0.9224	0.8853	0.8493	0.8145	0.7807	0.7481	0.7164	0.6857	0.6561	0.6274	0.5997	0.5729	0.5470	0.5220	0.4979	0.4746	0.4521	4	4	
	1	0.0388	0.0753	0.1095	0.1416	0.1715	0.1993	0.2252	0.2492	0.2713	0.2916	0.3102	0.3271	0.3424	0.3562	0.3685	0.3793	0.3888	0.3970	3	3	
	2	0.0006	0.0023	0.0051	0.0088	0.0135	0.0191	0.0254	0.0325	0.0402	0.0486	0.0575	0.0669	0.0767	0.0870	0.0975	0.1084	0.1195	0.1307	2	2	
	3	0.0000	0.0000	0.0001	0.0002	0.0005	0.0008	0.0013	0.0019	0.0027	0.0036	0.0047	0.0061	0.0076	0.0094	0.0115	0.0138	0.0163	0.0191	1	1	
	4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0007	0.0008	0.0010	0	4	
5	0	0.9510	0.9039	0.8587	0.8154	0.7738	0.7339	0.6957	0.6591	0.6240	0.5905	0.5584	0.5277	0.4984	0.4704	0.4437	0.4182	0.3939	0.3707	5	5	
	1	0.0480	0.0922	0.1328	0.1699	0.2036	0.2342	0.2618	0.2866	0.3086	0.3280	0.3451	0.3598	0.3724	0.3829	0.3915	0.3983	0.4034	0.4069	4	4	
	2	0.0010	0.0038	0.0082	0.0142	0.0214	0.0299	0.0394	0.0498	0.0610	0.0729	0.0853	0.0981	0.1113	0.1247	0.1382	0.1517	0.1652	0.1786	3	3	
	3	0.0000	0.0001	0.0003	0.0006	0.0011	0.0019	0.0030	0.0043	0.0060	0.0081	0.0105	0.0134	0.0166	0.0203	0.0244	0.0289	0.0338	0.0392	2	2	
	4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002	0.0003	0.0004	0.0007	0.0012	0.0017	0.0022	0.0028	0.0035	0.0043	0.005	1	1	
	5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0	5	
6	0	0.9415	0.8858	0.8330	0.7828	0.7351	0.6899	0.6470	0.6064	0.5679	0.5314	0.4970	0.4644	0.4336	0.4046	0.3771	0.3513	0.3269	0.3040	6	6	
	1	0.0571	0.1085	0.1546	0.1957	0.2321	0.2642	0.2922	0.3164	0.3370	0.3543	0.3685	0.3800	0.3888	0.3952	0.3993	0.4015	0.4018	0.4004	5	5	
	2	0.0014	0.0055	0.0120	0.0204	0.0305	0.0422	0.0550	0.0688	0.0833	0.0984	0.1139	0.1295	0.1452	0.1608	0.1762	0.1912	0.2057	0.2197	4	4	
	3	0.0000	0.0002	0.0005	0.0011	0.0021	0.0036	0.0055	0.0080	0.0110	0.0146	0.0188	0.0236	0.0289	0.0349	0.0415	0.0486	0.0562	0.0643	3	3	
	4	0.0000	0.0000	0.0000	0.0000	0.0001	0.0002	0.0003	0.0005	0.0008	0.0012	0.0017	0.0024	0.0032	0.0043	0.0055	0.0069	0.0086	0.0106	2	2	
	5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	0.0003	0.0004	0.0005	0.0007	0.0009	0.001	1	1	
	6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	6	
7	0	0.9321	0.8681	0.8080	0.7514	0.6983	0.6485	0.6017	0.5578	0.5168	0.4783	0.4423	0.4087	0.3773	0.3479	0.3206	0.2951	0.2714	0.2493	7	7	
	1	0.0659	0.1240	0.1749	0.2192	0.2573	0.2897	0.3170	0.3396	0.3578	0.3720	0.3827	0.3901	0.3946	0.3965	0.3960	0.3935	0.3891	0.3830	6	6	
	2	0.0020	0.0076	0.0162	0.0274	0.0406	0.0555	0.0716	0.0886	0.1061	0.1240	0.1419	0.1596	0.1769	0.1936	0.2097	0.2248	0.2391	0.2523	5	5	
	3	0.0000	0.0003	0.0008	0.0019	0.0036	0.0059	0.0090	0.0128	0.0175	0.0230	0.0292	0.0363	0.0441	0.0525	0.0617	0.0714	0.0816	0.0923	4	4	
	4	0.0000	0.0000	0.0000	0.0001	0.0002	0.0004	0.0007	0.0011	0.0017	0.0026	0.0036	0.0049	0.0066	0.0086	0.0109	0.0136	0.0167	0.0203	3	3	
	5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0002	0.0003	0.0005	0.0007	0.0011	0.0016	0.0021	0.0027	0.0032	0.0037	2	2	
	6	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0002	1	1	
	7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0	7	

		λ									
X	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	
0	0.0450	0.0408	0.0369	0.0334	0.0302	0.0273	0.0247	0.0224	0.0202	0.0183	
1	0.1397	0.1304	0.1217	0.1135	0.1057	0.0984	0.0915	0.0850	0.0789	0.0733	
2	0.2165	0.2087	0.2008	0.1929	0.1850	0.1771	0.1692	0.1615	0.1539	0.1465	
3	0.2237	0.2226	0.2209	0.2186	0.2158	0.2125	0.2087	0.2046	0.2001	0.1954	
4	0.1734	0.1781	0.1823	0.1858	0.1888	0.1912	0.1931	0.1944	0.1951	0.1954	
5	0.1075	0.1140	0.1203	0.1264	0.1322	0.1377	0.1429	0.1477	0.1522	0.1563	
6	0.0555	0.0608	0.0662	0.0716	0.0771	0.0826	0.0881	0.0936	0.0989	0.1042	
7	0.0246	0.0278	0.0312	0.0348	0.0385	0.0425	0.0466	0.0508	0.0551	0.0595	
8	0.0095	0.0111	0.0129	0.0148	0.0169	0.0191	0.0215	0.0241	0.0269	0.0298	
9	0.0033	0.0040	0.0047	0.0056	0.0066	0.0076	0.0089	0.0102	0.0116	0.0132	
10	0.0010	0.0013	0.0016	0.0019	0.0023	0.0028	0.0033	0.0039	0.0045	0.0053	
11	0.0003	0.0004	0.0005	0.0006	0.0007	0.0009	0.0011	0.0013	0.0016	0.0019	
12	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	
13	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	
14	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	

		λ									
X	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	
0	0.0166	0.0150	0.0136	0.0123	0.0111	0.0101	0.0091	0.0082	0.0074	0.0067	
1	0.0679	0.0630	0.0583	0.0540	0.0500	0.0462	0.0427	0.0395	0.0365	0.0337	
2	0.1393	0.1323	0.1254	0.1188	0.1125	0.1063	0.1005	0.0948	0.0894	0.0842	
3	0.1904	0.1852	0.1798	0.1743	0.1687	0.1631	0.1574	0.1517	0.1460	0.1404	
4	0.1951	0.1944	0.1933	0.1917	0.1898	0.1875	0.1849	0.1820	0.1789	0.1755	
5	0.1600	0.1633	0.1662	0.1687	0.1708	0.1725	0.1738	0.1747	0.1753	0.1755	
6	0.1093	0.1143	0.1191	0.1237	0.1281	0.1323	0.1362	0.1398	0.1432	0.1462	
7	0.0640	0.0686	0.0732	0.0778	0.0824	0.0869	0.0914	0.0959	0.1022	0.1044	
8	0.0328	0.0360	0.0393	0.0428	0.0463	0.0500	0.0537	0.0575	0.0614	0.0653	
9	0.0150	0.0168	0.0188	0.0209	0.0232	0.0255	0.0280	0.0307	0.0334	0.0363	
10	0.0061	0.0071	0.0081	0.0092	0.0104	0.0118	0.0132	0.0147	0.0164	0.0181	
11	0.0023	0.0027	0.0032	0.0037	0.0043	0.0049	0.0056	0.0064	0.0073	0.0082	
12	0.0008	0.0009	0.0011	0.0014	0.0016	0.0019	0.0022	0.0026	0.0030	0.0034	
13	0.0002	0.0003	0.0004	0.0004	0.0006	0.0007	0.0008	0.0009	0.0011	0.0013	
14	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	
15	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	

		λ									
X	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	
0	0.0061	0.0055	0.0050	0.0045	0.0041	0.0037	0.0033	0.0030	0.0027	0.0025	
1	0.0311	0.0287	0.0265	0.0244	0.0225	0.0207	0.0191	0.0176	0.0162	0.0149	
2	0.0793	0.0746	0.0701	0.0659	0.0618	0.0580	0.0544	0.0509	0.0477	0.0446	
3	0.1348	0.1293	0.1239	0.1185	0.1133	0.1082	0.1033	0.0985	0.0938	0.0892	
4	0.1719	0.1681	0.1641	0.1600	0.1558	0.1515	0.1472	0.1428	0.1383	0.1339	
5	0.1753	0.1748	0.1740	0.1728	0.1714	0.1697	0.1678	0.1656	0.1632	0.1606	
6	0.1490	0.1515	0.1537	0.1555	0.1571	0.1584	0.1594	0.1601	0.1605	0.1606	
7	0.1086	0.1125	0.1163	0.1200	0.1234	0.1267	0.1298	0.1326	0.1353	0.1377	
8	0.0692	0.0731	0.0771	0.0810	0.0849	0.0887	0.0925	0.0962	0.0998	0.1033	
9	0.0392	0.0423	0.0454	0.0486	0.0519	0.0552	0.0586	0.0620	0.0654	0.0688	
10	0.0200	0.0220	0.0241	0.0262	0.0285	0.0309	0.0334	0.0359	0.0386	0.0413	
11	0.0093	0.0104	0.0116	0.0129	0.0143	0.0157	0.0173	0.0190	0.0207	0.0225	
12	0.0039	0.0045	0.0051	0.0058	0.0065	0.0073	0.0082	0.0092	0.0102	0.0113	
13	0.0015	0.0018	0.0021	0.0024	0.0028	0.0032	0.0036	0.0041	0.0046	0.0052	
14	0.0006	0.0007	0.0008	0.0009	0.0011	0.0013	0.0015	0.0017	0.0019	0.0022	
15	0.0002	0.0002	0.0003	0.0003	0.0004	0.0005	0.0006	0.0007	0.0008	0.0009	
16	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0003	0.0003	
17	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0001	0.0001	