



UNIVERSITI SAINS MALAYSIA

Final Examination
2016/2017 Academic Session

May/June 2017

**JIM 104 – Introduction To Statistics [*Pengantar Statistik*] /
JIM 106 – Elementary Statistics [*Asas Statistik*]**

Duration : 3 hours
[*Masa: 3 jam*]

Please ensure that this examination paper contains **TWENTY FOUR** printed pages before you begin the examination.

Answer **ALL** questions. You may answer either in Bahasa Malaysia or in English.

Read the instructions carefully before answering.

Each question is worth 100 marks.

In the event of any discrepancies, the English version shall be used.

*Sila pastikan bahawa kertas peperiksaan ini mengandungi **DUA PULUH EMPAT** muka surat yang bercetak sebelum anda memulakan peperiksaan ini.*

*Jawab **SEMUA** soalan. Anda dibenarkan menjawab sama ada dalam Bahasa Malaysia atau Bahasa Inggeris.*

Baca arahan dengan teliti sebelum anda menjawab soalan.

Setiap soalan diperuntukkan 100 markah.

Sekiranya terdapat sebarang percanggahan pada soalan peperiksaan, versi Bahasa Inggeris hendaklah digunakan.

1. (a) The number of lecturers listed for a variety of private colleges which offer only bachelor's degrees is listed below.

165 221 218 206 138 135 224 204
70 210 207 154 155 82 120 116
176 162 225 214 93 389 77 135
221 161 128 310

- (i) Construct a frequency distribution with 7 classes. Use (70 - 116) as the first class.
- (ii) Discuss the shape of the distribution obtained in (i).
- (iii) Use (i) to construct a frequency polygon and an ogive.
- (iv) What proportion of the colleges has 180 or more lecturers?

(60 marks)

- (b) Given events A, B, C are independent, $P(A) = 1/2$, $P(B) = 1/4$ and $P(C) = 1/8$, find

(i) $P(\bar{A} \cup (B \cap C))$.

(ii) $P(A \cup B \cup C)$.

(40 marks)

2. (a) The number of inquiries received per day for a college catalog is distributed as shown:

Number of inquiries X	22	23	24	25	26	27
Probability $p(x)$	0.08	0.19	k	0.25	0.07	0.05

Find

- (i) k .
- (ii) $E(X)$.
- (iii) $\text{Var}(3X + 5)$.

(40 marks)

...3/-

- (b) A population is known to be normally distributed with $\sigma^2 = 25$. Find the sample size so that the confidence level of the difference between the sample mean and the population mean being less than 1 unit is 95%.
(30 marks)
- (c) Roll two standard dice and add the numbers. What is the probability of getting a number larger than 9 for the first time on the third roll?
(30 marks)
3. (a) A study found that the average stopping distance of a school bus traveling at 50 miles per hour was 264 feet. A group of automotive engineers decided to conduct a study of school buses and found that for 20 buses, the average stopping distance of buses traveling at 50 miles per hour was 262.3 feet. The standard deviation of the population was 3 feet. Test the claim that the average stopping distance of the company's buses is actually less than 264 feet using the P -value method. Assume that the variable is normally distributed. Use $\alpha = 0.01$.
(50 marks)
- (b) X is normally distributed with mean μ and variance σ^2 .
Given $P(X > 1000) = 0.9772$ and $P(X > 13000) = 0.0228$, find μ and σ .
(50 marks)
4. (a) A mail order company receives an average of 5 orders per 500 solicitations. If it sends out 100 advertisements, find the probability of receiving at least 2 orders.
(35 marks)
- (b) A study of 75 workers found that 53 people rode the bus to work each day. Find the 95% confidence interval of the proportion of all workers who rode the bus to work.
(35 marks)
- (c) A sample of labour costs per hour to assemble a certain product has a mean of RM2.60 and a standard deviation of RM0.15. Using Chebyshev's theorem, find the range in which at least 88.89% of the data will lie.
(30 marks)

5. (a) As an aid for improving students' study habits, nine students were randomly selected to attend a seminar on the importance of education in life. The table shows the number of hours each student studied per week before and after the seminar. At $\alpha = 0.10$, did attending the seminar increase the number of hours the students studied per week?

Before	9	12	6	15	3	18	10	13	7
After	9	17	9	20	2	21	15	22	6

(50 marks)

- (b) A box contains 6 blue balls, 3 red balls and 1 yellow ball. Two balls are taken from the box without replacement. For each ball taken, you are paid RM1 for a blue ball, RM2 for a red ball and RM6 for a yellow ball. Let Y be the amount you are paid. Find

(i) the probability distribution of Y .

(ii) $E(Y)$.

(50 marks)

1. (a) Bilangan pensyarah yang disenaraikan untuk pelbagai kolej swasta yang menawarkan hanya ijazah sarjana muda disenaraikan di bawah.

165 221 218 206 138 135 224 204
 70 210 207 154 155 82 120 116
 176 162 225 214 93 389 77 135
 221 161 128 310

- (i) Bina taburan frekuensi dengan 7 kelas. Guna (70 - 116) sebagai kelas pertama.
 (ii) Bincang bentuk taburan yang diperolehi dalam (i).
 (iii) Guna (i) untuk membina poligon frekuensi dan ogif.
 (iv) Berapakah peratusan daripada kolej tersebut yang mempunyai 180 atau lebih pensyarah?

(60 markah)

- (b) Diberi peristiwa A, B, C tak bersandar, $P(A) = 1/2$, $P(B) = 1/4$ dan $P(C) = 1/8$, cari

(i) $P(\bar{A} \cup (B \cap C))$.

(ii) $P(A \cup B \cup C)$.

(40 markah)

2. (a) Bilangan pertanyaan yang diterima setiap hari untuk katalog kolej bertabur seperti berikut:

Bilangan pertanyaan X	22	23	24	25	26	27
Keberangalian $p(x)$	0.08	0.19	k	0.25	0.07	0.05

Cari

- (i) k .
 (ii) $E(X)$.
 (iii) $\text{Var}(3X + 5)$.

(40 markah)

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- (b) Satu populasi dikenali bertaburan normal dengan $\sigma^2 = 25$. Cari saiz sampel supaya aras keyakinan perbezaan antara min sampel dan min populasi kurang daripada 1 unit, ialah 95%.
(30 markah)
- (c) Lemparkan dua biji dadu piawai dan tambah nombor-nombor yang muncul. Apakah kebarangkalian untuk mendapatkan jumlah yang lebih besar daripada 9 buat kali pertama pada lemparan yang ketiga?
(30 markah)
3. (a) Satu kajian mendapati bahawa purata jarak berhenti bagi bas sekolah yang bergerak pada 50 batu sejam adalah 264 kaki. Sekumpulan jurutera automotif memutuskan untuk menjalankan satu kajian terhadap bas-bas sekolah dan mendapati untuk 20 buah bas, purata jarak berhenti bagi bas yang bergerak pada 50 batu sejam adalah 262.3 kaki. Sisihan piawai populasi adalah 3 kaki. Uji dakwaan bahawa purata jarak berhenti bas syarikat itu sebenarnya kurang daripada 264 kaki dengan menggunakan kaedah nilai- P . Andaikan pembolehubah bertaburan normal. Guna $\alpha = 0.01$.
(50 markah)
- (b) X bertaburan normal dengan min μ dan varians σ^2 .
Diberi $P(X > 1000) = 0.9772$ dan $P(X > 13000) = 0.0228$, cari μ dan σ .
(50 markah)
4. (a) Sebuah syarikat pesanan pos menerima purata 5 pesanan setiap 500 pencarian pelanggan. Jika syarikat tersebut menghantar 100 iklan, cari kebarangkalian syarikat tersebut menerima sekurang-kurangnya 2 pesanan.
(35 markah)
- (b) Satu kajian terhadap 75 orang pekerja mendapati bahawa 53 orang menaiki bas untuk ke tempat kerja setiap hari. Cari selang keyakinan 95% kadar pekerja yang menaiki bas untuk ke tempat kerja.
(35 markah)
- (c) Sampel kajian kos buruh sejam untuk memasang produk tertentu mempunyai min RM2.60 dan sisihan piawai RM0.15. Dengan menggunakan teorem Chebyshev, cari julat di mana sekurang-kurangnya 88.89% berada di dalam julat tersebut.
(30 markah)

5. (a) Sebagai bantuan untuk meningkatkan tabiat pelajar belajar, sembilan pelajar dipilih secara rawak untuk menghadiri seminar mengenai kepentingan pendidikan di dalam kehidupan. Jadual menunjukkan bilangan jam setiap pelajar belajar seminggu sebelum dan selepas seminar. Pada $\alpha = 0.10$, adakah menghadiri seminar meningkatkan bilangan jam pelajar belajar dalam seminggu?

Sebelum	9	12	6	15	3	18	10	13	7
Selepas	9	17	9	20	2	21	15	22	6

(50 markah)

- (b) Sebuah kotak mengandungi 6 bola biru, 3 bola merah dan 1 bola kuning. Dua biji bola diambil daripada kotak itu tanpa pengembalian. Untuk setiap bola yang diambil, anda dibayar RM1 untuk bola biru, RM2 untuk bola merah dan RM6 untuk bola kuning. Andai Y jumlah anda dibayar. Cari

- (i) taburan kebarangkalian bagi Y .
- (ii) $E(Y)$.

(50 markah)

Formulas**Chapter 3 Data Description**

$$\text{Mean for individual data: } \bar{X} = \frac{\sum X}{n}$$

$$\text{Mean for grouped data: } \bar{X} = \frac{\sum f \cdot X_m}{n}$$

Standard deviation for a sample:

$$s = \sqrt{\frac{n(\sum X^2) - (\sum X)^2}{n(n-1)}}$$

Standard deviation for grouped data:

$$s = \sqrt{\frac{n(\sum f \cdot X_m^2) - (\sum f \cdot X_m)^2}{n(n-1)}}$$

$$\text{Range rule of thumb: } s \approx \frac{\text{range}}{4}$$

Median for grouped data:

$$MD = \frac{(n/2) - cf}{f}(w) + L_m$$

where

n = sum of frequencies

cf = cumulative frequency of class immediately preceding the median class

w = width of median class

f = frequency of median class

L_m = lower boundary of median class

Chapter 4 Probability of Counting Rules

Addition rule 1 (mutually exclusive events):

$$P(A \text{ or } B) = P(A) + P(B)$$

Addition rule 2 (events not mutually exclusive):

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

Multiplication rule 1 (independent events):

$$P(A \text{ and } B) = P(A) \cdot P(B)$$

Multiplication rule 2 (dependent events):

$$P(A \text{ and } B) = P(A) \cdot P(B|A)$$

Conditional probability: $P(B|A) = \frac{P(A \text{ and } B)}{P(A)}$

Complementary events: $P(\bar{E}) = 1 - P(E)$

Fundamental counting rule: Total number of outcomes of a sequence when each event has a different number of possibilities: $k_1 \cdot k_2 \cdot k_3 \cdots k_n$

Permutation rule: Number of permutations of n objects taking r at a time is ${}_n P_r = \frac{n!}{(n-r)!}$

Combination rule: Number of combinations of r objects selected from n objects is

$${}_n C_r = \frac{n!}{(n-r)!r!}$$

Chapter 5 Discrete Probability Distributions

Mean for a probability distribution: $\mu = \sum [X \cdot P(X)]$

Variance and standard deviation for a probability distribution:

$$\sigma^2 = \sum [X^2 \cdot P(X)] - \mu^2$$

$$\sigma = \sqrt{\sum [X^2 \cdot P(X)] - \mu^2}$$

Expectation: $E(X) = \sum [X \cdot P(X)]$

Binomial probability: $P(X) = \frac{n!}{(n-X)!X!} \cdot p^X \cdot q^{n-X}$

Mean for binomial distribution: $\mu = n \cdot p$

Variance and standard deviation for the binomial distribution:

$$\sigma^2 = n \cdot p \cdot q \qquad \sigma = \sqrt{n \cdot p \cdot q}$$

Multinomial probability:

$$P(X) = \frac{n!}{X_1! X_2! X_3! \dots X_k!} \cdot p_1^{X_1} \cdot p_2^{X_2} \cdot p_3^{X_3} \dots p_k^{X_k}$$

Poisson probability: $P(X; \lambda) = \frac{e^{-\lambda} \lambda^X}{X!}$ where $X = 0, 1, 2, \dots$

Hypergeometric probability: $P(X) = \frac{{}_a C_X \cdot {}_b C_{n-X}}{{}_{a+b} C_n}$

Chapter 6 The Normal Distribution

Standard score: $z = \frac{X - \mu}{\sigma}$ or $\frac{X - \bar{X}}{s}$

Mean of sample means: $\mu_{\bar{X}} = \mu$

Standard error of the mean: $\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}}$

Central limit theorem formula: $z = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}}$

Chapter 7 Confidence Intervals and Sample Size

z confidence interval for means:

$$\bar{X} - z_{\alpha/2} \left(\frac{\sigma}{\sqrt{n}} \right) < \mu < \bar{X} + z_{\alpha/2} \left(\frac{\sigma}{\sqrt{n}} \right)$$

t confidence interval for means:

$$\bar{X} - t_{\alpha/2} \left(\frac{s}{\sqrt{n}} \right) < \mu < \bar{X} + t_{\alpha/2} \left(\frac{s}{\sqrt{n}} \right)$$

Sample size for means: $n = \left(\frac{z_{\alpha/2} \cdot \sigma}{E} \right)^2$ where E is the maximum error of estimate

Confidence interval for a proportion:

$$\hat{p} - (z_{\alpha/2}) \sqrt{\frac{\hat{p}\hat{q}}{n}} < p < \hat{p} + (z_{\alpha/2}) \sqrt{\frac{\hat{p}\hat{q}}{n}}$$

Sample size for a proportion: $n = \hat{p}\hat{q}\left(\frac{z_{\alpha/2}}{E}\right)^2$

where $\hat{p} = \frac{X}{n}$ and $\hat{q} = 1 - \hat{p}$

Confidence interval for variance:

$$\frac{(n-1)s^2}{\chi^2_{\text{right}}} < \sigma^2 < \frac{(n-1)s^2}{\chi^2_{\text{left}}}$$

Confidence interval for standard deviation:

$$\sqrt{\frac{(n-1)s^2}{\chi^2_{\text{right}}}} < \sigma < \sqrt{\frac{(n-1)s^2}{\chi^2_{\text{left}}}}$$

Chapter 8 Hypothesis Testing

z test : $z = \frac{\bar{X} - \mu}{\sigma/\sqrt{n}}$ for any value n . If $n < 30$, population must be normally distributed.

$$z = \frac{\bar{X} - \mu}{s/\sqrt{n}} \text{ for } \sigma \text{ unknown and } n \geq 30$$

t test : $t = \frac{\bar{X} - \mu}{s/\sqrt{n}}$ for $n < 30$ (d.f. = $n - 1$)

z test for proportions: $z = \frac{\hat{p} - p}{\sqrt{pq/n}}$

Chi-square test for a single variance: $\chi^2 = \frac{(n-1)s^2}{\sigma^2}$

(d.f. = $n - 1$)

Chapter 9 Testing the Difference Between Two Means, Two Variances and Two Proportions

z test for comparing two means (independent samples);

$$z = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

Formula for the confidence interval for difference of two means (large samples):

$$(\bar{X}_1 - \bar{X}_2) - z_{\alpha/2} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}} < \mu_1 - \mu_2 < (\bar{X}_1 - \bar{X}_2) + z_{\alpha/2} \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$

Note: s_1^2 and s_2^2 can be used when $n_1 \geq 30$ and $n_2 \geq 30$.

F test for comparing two variances: $F = \frac{s_1^2}{s_2^2}$

where s_1^2 is the larger variance and

$$\text{d.f.N.} = n_1 - 1, \text{d.f.D} = n_2 - 1$$

t test for comparing two means (independent samples, variances not equal):

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

(d.f. = the smaller on $n_1 - 1$ or $n_2 - 1$)

Formula for the confidence interval for difference of two means (small independent samples, variance unequal):

$$(\bar{X}_1 - \bar{X}_2) - t_{\alpha/2} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}} < \mu_1 - \mu_2 < (\bar{X}_1 - \bar{X}_2) + t_{\alpha/2} \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

(d.f. = smaller of $n_1 - 1$ and $n_2 - 1$)

t test for comparing two means (independent samples, variances equal):

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 + n_2 - 2)} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

(d.f. = $n_1 + n_2 - 2$)

Formula for the confidence interval for difference of two means (small independent samples, variances equal):

$$(\bar{X}_1 - \bar{X}_2) - t_{\alpha/2} \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}$$

$$(\bar{X}_1 - \bar{X}_2) + t_{\alpha/2} \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}$$

and d.f. = $n_1 + n_2 - 2$.

t test for comparing two means for dependent samples:

$$t = \frac{\bar{D} - \mu_D}{s_D / \sqrt{n}} \quad \text{where } \bar{D} = \frac{\sum D}{n} \quad \text{and}$$

$$s_D = \sqrt{\frac{n \sum D^2 - (\sum D)^2}{n(n-1)}} \quad (\text{d.f.} = n - 1)$$

Formula for confidence interval for the mean of the difference for dependent samples:

$$\bar{D} - t_{\alpha/2} \frac{S_D}{\sqrt{n}} < \mu_D < \bar{D} + t_{\alpha/2} \frac{S_D}{\sqrt{n}}$$

(d.f. = $n - 1$)

t test for comparing two proportions:

$$z = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{\sqrt{\bar{p}\bar{q} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$\text{where } \bar{p} = \frac{X_1 + X_2}{n_1 + n_2} \quad \hat{p}_1 = \frac{X_1}{n_1}$$

$$\bar{q} = 1 - \bar{p} \quad \hat{p}_2 = \frac{X_2}{n_2}$$

Formula for the confidence interval for the difference of two proportions:

$$(\hat{p}_1 - \hat{p}_2) - z_{\alpha/2} \sqrt{\frac{\hat{p}_1 \hat{q}_1}{n_1} + \frac{\hat{p}_2 \hat{q}_2}{n_2}} < p_1 - p_2 < (\hat{p}_1 - \hat{p}_2) + z_{\alpha/2} \sqrt{\frac{\hat{p}_1 \hat{q}_1}{n_1} + \frac{\hat{p}_2 \hat{q}_2}{n_2}}$$

Table E The Standard Normal Distribution

Cumulative Standard Normal Distribution

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641

For z values less than -3.49, use 0.0001.

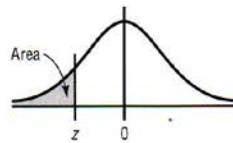


Table E (continued)										
Cumulative Standard Normal Distribution										
<i>z</i>	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998

For *z* values greater than 3.49, use 0.9999.

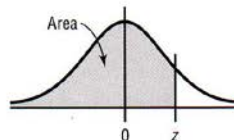


TABLE F The t Distribution

d.f.	Confidence intervals	80%	90%	95%	98%	99%
	One tail, α	0.10	0.05	0.025	0.01	0.005
	Two tails, α	0.20	0.10	0.05	0.02	0.01
1		3.078	6.314	12.706	31.821	63.657
2		1.886	2.920	4.303	6.965	9.925
3		1.638	2.353	3.182	4.541	5.841
4		1.533	2.132	2.776	3.747	4.604
5		1.476	2.015	2.571	3.365	4.032
6		1.440	1.943	2.447	3.143	3.707
7		1.415	1.895	2.365	2.998	3.499
8		1.397	1.860	2.306	2.896	3.355
9		1.383	1.833	2.262	2.821	3.250
10		1.372	1.812	2.228	2.764	3.169
11		1.363	1.796	2.201	2.718	3.106
12		1.356	1.782	2.179	2.681	3.055
13		1.350	1.771	2.160	2.650	3.012
14		1.345	1.761	2.145	2.624	2.977
15		1.341	1.753	2.131	2.602	2.947
16		1.337	1.746	2.120	2.583	2.921
17		1.333	1.740	2.110	2.567	2.898
18		1.330	1.734	2.101	2.552	2.878
19		1.328	1.729	2.093	2.539	2.861
20		1.325	1.725	2.086	2.528	2.845
21		1.323	1.721	2.080	2.518	2.831
22		1.321	1.717	2.074	2.508	2.819
23		1.319	1.714	2.069	2.500	2.807
24		1.318	1.711	2.064	2.492	2.797
25		1.316	1.708	2.060	2.485	2.787
26		1.315	1.706	2.056	2.479	2.779
27		1.314	1.703	2.052	2.473	2.771
28		1.313	1.701	2.048	2.467	2.763
29		1.311	1.699	2.045	2.462	2.756
30		1.310	1.697	2.042	2.457	2.750
32		1.309	1.694	2.037	2.449	2.738
34		1.307	1.691	2.032	2.441	2.728
36		1.306	1.688	2.028	2.434	2.719
38		1.304	1.686	2.024	2.429	2.712
40		1.303	1.684	2.021	2.423	2.704
45		1.301	1.679	2.014	2.412	2.690
50		1.299	1.676	2.009	2.403	2.678
55		1.297	1.673	2.004	2.396	2.668
60		1.296	1.671	2.000	2.390	2.660
65		1.295	1.669	1.997	2.385	2.654
70		1.294	1.667	1.994	2.381	2.648
75		1.293	1.665	1.992	2.377	2.643
80		1.292	1.664	1.990	2.374	2.639
90		1.291	1.662	1.987	2.368	2.632
100		1.290	1.660	1.984	2.364	2.626
500		1.283	1.648	1.965	2.334	2.586
1000		1.282	1.646	1.962	2.330	2.581
(z) ∞		1.282 ^a	1.645 ^b	1.960	2.326 ^c	2.576 ^d

^aThis value has been rounded to 1.28 in the textbook.

^bThis value has been rounded to 1.65 in the textbook.

^cThis value has been rounded to 2.33 in the textbook.

^dThis value has been rounded to 2.58 in the textbook.

Source: Adapted from W. H. Beyer, *Handbook of Tables for Probability and Statistics*, 2nd ed., CRC Press, Boca Raton, Fla., 1986. Reprinted with permission.

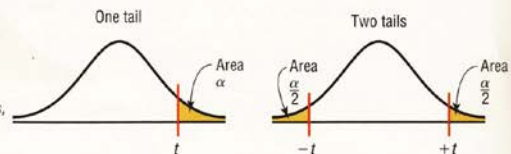


Table C		The Poisson Distribution									
		λ									
x		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
0		.9048	.8187	.7408	.6703	.6065	.5488	.4966	.4493	.4066	.3679
1		.0905	.1637	.2222	.2681	.3033	.3293	.3476	.3595	.3659	.3679
2		.0045	.0164	.0333	.0536	.0758	.0988	.1217	.1438	.1647	.1839
3		.0002	.0011	.0033	.0072	.0126	.0198	.0284	.0383	.0494	.0613
4		.0000	.0001	.0003	.0007	.0016	.0030	.0050	.0077	.0111	.0153
5		.0000	.0000	.0000	.0001	.0002	.0004	.0007	.0012	.0020	.0031
6		.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0002	.0003	.0005
7		.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001
		λ									
x		1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
0		.3329	.3012	.2725	.2466	.2231	.2019	.1827	.1653	.1496	.1353
1		.3662	.3614	.3543	.3452	.3347	.3230	.3106	.2975	.2842	.2707
2		.2014	.2169	.2303	.2417	.2510	.2584	.2640	.2678	.2700	.2707
3		.0738	.0867	.0998	.1128	.1255	.1378	.1496	.1607	.1710	.1804
4		.0203	.0260	.0324	.0395	.0471	.0551	.0636	.0723	.0812	.0902
5		.0045	.0062	.0084	.0111	.0141	.0176	.0216	.0260	.0309	.0361
6		.0008	.0012	.0018	.0026	.0035	.0047	.0061	.0078	.0098	.0120
7		.0001	.0002	.0003	.0005	.0008	.0011	.0015	.0020	.0027	.0034
8		.0000	.0000	.0001	.0001	.0001	.0002	.0003	.0005	.0006	.0009
9		.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0001	.0001	.0002
		λ									
x		2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
0		.1225	.1108	.1003	.0907	.0821	.0743	.0672	.0608	.0550	.0498
1		.2572	.2438	.2306	.2177	.2052	.1931	.1815	.1703	.1596	.1494
2		.2700	.2681	.2652	.2613	.2565	.2510	.2450	.2384	.2314	.2240
3		.1890	.1966	.2033	.2090	.2138	.2176	.2205	.2225	.2237	.2240
4		.0992	.1082	.1169	.1254	.1336	.1414	.1488	.1557	.1622	.1680
5		.0417	.0476	.0538	.0602	.0668	.0735	.0804	.0872	.0940	.1008
6		.0146	.0174	.0206	.0241	.0278	.0319	.0362	.0407	.0455	.0504
7		.0044	.0055	.0068	.0083	.0099	.0118	.0139	.0163	.0188	.0216
8		.0011	.0015	.0019	.0025	.0031	.0038	.0047	.0057	.0068	.0081
9		.0003	.0004	.0005	.0007	.0009	.0011	.0014	.0018	.0022	.0027
10		.0001	.0001	.0001	.0002	.0002	.0003	.0004	.0005	.0006	.0008
11		.0000	.0000	.0000	.0000	.0000	.0001	.0001	.0001	.0002	.0002
12		.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001
		λ									
x		3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
0		.0450	.0408	.0369	.0334	.0302	.0273	.0247	.0224	.0202	.0183
1		.1397	.1304	.1217	.1135	.1057	.0984	.0915	.0850	.0789	.0733
2		.2165	.2087	.2008	.1929	.1850	.1771	.1692	.1615	.1539	.1465
3		.2237	.2226	.2209	.2186	.2158	.2125	.2087	.2046	.2001	.1954
4		.1734	.1781	.1823	.1858	.1888	.1912	.1931	.1944	.1951	.1954

Table C (continued)

x	λ									
	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
5	.1075	.1140	.1203	.1264	.1322	.1377	.1429	.1477	.1522	.1563
6	.0555	.0608	.0662	.0716	.0771	.0826	.0881	.0936	.0989	.1042
7	.0246	.0278	.0312	.0348	.0385	.0425	.0466	.0508	.0551	.0595
8	.0095	.0111	.0129	.0148	.0169	.0191	.0215	.0241	.0269	.0298
9	.0033	.0040	.0047	.0056	.0066	.0076	.0089	.0102	.0116	.0132
10	.0010	.0013	.0016	.0019	.0023	.0028	.0033	.0039	.0045	.0053
11	.0003	.0004	.0005	.0006	.0007	.0009	.0011	.0013	.0016	.0019
12	.0001	.0001	.0001	.0002	.0002	.0003	.0003	.0004	.0005	.0006
13	.0000	.0000	.0000	.0000	.0001	.0001	.0001	.0001	.0002	.0002
14	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001
x	λ									
	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
0	.0166	.0150	.0136	.0123	.0111	.0101	.0091	.0082	.0074	.0067
1	.0679	.0630	.0583	.0540	.0500	.0462	.0427	.0395	.0365	.0337
2	.1393	.1323	.1254	.1188	.1125	.1063	.1005	.0948	.0894	.0842
3	.1904	.1852	.1798	.1743	.1687	.1631	.1574	.1517	.1460	.1404
4	.1951	.1944	.1933	.1917	.1898	.1875	.1849	.1820	.1789	.1755
5	.1600	.1633	.1662	.1687	.1708	.1725	.1738	.1747	.1753	.1755
6	.1093	.1143	.1191	.1237	.1281	.1323	.1362	.1398	.1432	.1462
7	.0640	.0686	.0732	.0778	.0824	.0869	.0914	.0959	.1002	.1044
8	.0328	.0360	.0393	.0428	.0463	.0500	.0537	.0575	.0614	.0653
9	.0150	.0168	.0188	.0209	.0232	.0255	.0280	.0307	.0334	.0363
10	.0061	.0071	.0081	.0092	.0104	.0118	.0132	.0147	.0164	.0181
11	.0023	.0027	.0032	.0037	.0043	.0049	.0056	.0064	.0073	.0082
12	.0008	.0009	.0011	.0014	.0016	.0019	.0022	.0026	.0030	.0034
13	.0002	.0003	.0004	.0005	.0006	.0007	.0008	.0009	.0011	.0013
14	.0001	.0001	.0001	.0001	.0002	.0002	.0003	.0003	.0004	.0005
15	.0000	.0000	.0000	.0000	.0001	.0001	.0001	.0001	.0001	.0002
x	λ									
	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0
0	.0061	.0055	.0050	.0045	.0041	.0037	.0033	.0030	.0027	.0025
1	.0311	.0287	.0265	.0244	.0225	.0207	.0191	.0176	.0162	.0149
2	.0793	.0746	.0701	.0659	.0618	.0580	.0544	.0509	.0477	.0446
3	.1348	.1293	.1239	.1185	.1133	.1082	.1033	.0985	.0938	.0892
4	.1719	.1681	.1641	.1600	.1558	.1515	.1472	.1428	.1383	.1339

Table C (continued)										
x	λ									
	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0
5	.1753	.1748	.1740	.1728	.1714	.1697	.1678	.1656	.1632	.1606
6	.1490	.1515	.1537	.1555	.1571	.1584	.1594	.1601	.1605	.1606
7	.1086	.1125	.1163	.1200	.1234	.1267	.1298	.1326	.1353	.1377
8	.0692	.0731	.0771	.0810	.0849	.0887	.0925	.0962	.0998	.1033
9	.0392	.0423	.0454	.0486	.0519	.0552	.0586	.0620	.0654	.0688
10	.0200	.0220	.0241	.0262	.0285	.0309	.0334	.0359	.0386	.0413
11	.0093	.0104	.0116	.0129	.0143	.0157	.0173	.0190	.0207	.0225
12	.0039	.0045	.0051	.0058	.0065	.0073	.0082	.0092	.0102	.0113
13	.0015	.0018	.0021	.0024	.0028	.0032	.0036	.0041	.0046	.0052
14	.0006	.0007	.0008	.0009	.0011	.0013	.0015	.0017	.0019	.0022
15	.0002	.0002	.0003	.0003	.0004	.0005	.0006	.0007	.0008	.0009
16	.0001	.0001	.0001	.0001	.0001	.0002	.0002	.0002	.0003	.0003
17	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0001	.0001	.0001
x	λ									
	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	7.0
0	.0022	.0020	.0018	.0017	.0015	.0014	.0012	.0011	.0010	.0009
1	.0137	.0126	.0116	.0106	.0098	.0090	.0082	.0076	.0070	.0064
2	.0417	.0390	.0364	.0340	.0318	.0296	.0276	.0258	.0240	.0223
3	.0848	.0806	.0765	.0726	.0688	.0652	.0617	.0584	.0552	.0521
4	.1294	.1249	.1205	.1162	.1118	.1076	.1034	.0992	.0952	.0912
5	.1579	.1549	.1519	.1487	.1454	.1420	.1385	.1349	.1314	.1277
6	.1605	.1601	.1595	.1586	.1575	.1562	.1546	.1529	.1511	.1490
7	.1399	.1418	.1435	.1450	.1462	.1472	.1480	.1486	.1489	.1490
8	.1066	.1099	.1130	.1160	.1188	.1215	.1240	.1263	.1284	.1304
9	.0723	.0757	.0791	.0825	.0858	.0891	.0923	.0954	.0985	.1014
10	.0441	.0469	.0498	.0528	.0558	.0588	.0618	.0649	.0679	.0710
11	.0245	.0265	.0285	.0307	.0330	.0353	.0377	.0401	.0426	.0452
12	.0124	.0137	.0150	.0164	.0179	.0194	.0210	.0227	.0245	.0264
13	.0058	.0065	.0073	.0081	.0089	.0098	.0108	.0119	.0130	.0142
14	.0025	.0029	.0033	.0037	.0041	.0046	.0052	.0058	.0064	.0071
15	.0010	.0012	.0014	.0016	.0018	.0020	.0023	.0026	.0029	.0033
16	.0004	.0005	.0005	.0006	.0007	.0008	.0010	.0011	.0013	.0014
17	.0001	.0002	.0002	.0002	.0003	.0003	.0004	.0004	.0005	.0006
18	.0000	.0001	.0001	.0001	.0001	.0001	.0001	.0002	.0002	.0002
19	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0001	.0001

Table C (continued)										
x	λ									
	7.1	7.2	7.3	7.4	7.5	7.6	7.7	7.8	7.9	8.0
0	.0008	.0007	.0007	.0006	.0006	.0005	.0005	.0004	.0004	.0003
1	.0059	.0054	.0049	.0045	.0041	.0038	.0035	.0032	.0029	.0027
2	.0208	.0194	.0180	.0167	.0156	.0145	.0134	.0125	.0116	.0107
3	.0492	.0464	.0438	.0413	.0389	.0366	.0345	.0324	.0305	.0286
4	.0874	.0836	.0799	.0764	.0729	.0696	.0663	.0632	.0602	.0573
5	.1241	.1204	.1167	.1130	.1094	.1057	.1021	.0986	.0951	.0916
6	.1468	.1445	.1420	.1394	.1367	.1339	.1311	.1282	.1252	.1221
7	.1489	.1486	.1481	.1474	.1465	.1454	.1442	.1428	.1413	.1396
8	.1321	.1337	.1351	.1363	.1373	.1382	.1388	.1392	.1395	.1396
9	.1042	.1070	.1096	.1121	.1144	.1167	.1187	.1207	.1224	.1241
10	.0740	.0770	.0800	.0829	.0858	.0887	.0914	.0941	.0967	.0993
11	.0478	.0504	.0531	.0558	.0585	.0613	.0640	.0667	.0695	.0722
12	.0283	.0303	.0323	.0344	.0366	.0388	.0411	.0434	.0457	.0481
13	.0154	.0168	.0181	.0196	.0211	.0227	.0243	.0260	.0278	.0296
14	.0078	.0086	.0095	.0104	.0113	.0123	.0134	.0145	.0157	.0169
15	.0037	.0041	.0046	.0051	.0057	.0062	.0069	.0075	.0083	.0090
16	.0016	.0019	.0021	.0024	.0026	.0030	.0033	.0037	.0041	.0045
17	.0007	.0008	.0009	.0010	.0012	.0013	.0015	.0017	.0019	.0021
18	.0003	.0003	.0004	.0004	.0005	.0006	.0006	.0007	.0008	.0009
19	.0001	.0001	.0001	.0002	.0002	.0002	.0003	.0003	.0003	.0004
20	.0000	.0000	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0002
21	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0001
x	λ									
	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0
0	.0003	.0003	.0002	.0002	.0002	.0002	.0002	.0002	.0001	.0001
1	.0025	.0023	.0021	.0019	.0017	.0016	.0014	.0013	.0012	.0011
2	.0100	.0092	.0086	.0079	.0074	.0068	.0063	.0058	.0054	.0050
3	.0269	.0252	.0237	.0222	.0208	.0195	.0183	.0171	.0160	.0150
4	.0544	.0517	.0491	.0466	.0443	.0420	.0398	.0377	.0357	.0337
5	.0882	.0849	.0816	.0784	.0752	.0722	.0692	.0663	.0635	.0607
6	.1191	.1160	.1128	.1097	.1066	.1034	.1003	.0972	.0941	.0911
7	.1378	.1358	.1338	.1317	.1294	.1271	.1247	.1222	.1197	.1171
8	.1395	.1392	.1388	.1382	.1375	.1366	.1356	.1344	.1332	.1318
9	.1256	.1269	.1280	.1290	.1299	.1306	.1311	.1315	.1317	.1318

Table C		<i>(continued)</i>									
<i>x</i>	λ										
	8.1	8.2	8.3	8.4	8.5	8.6	8.7	8.8	8.9	9.0	
10	.1017	.1040	.1063	.1084	.1104	.1123	.1140	.1157	.1172	.1186	
11	.0749	.0776	.0802	.0828	.0853	.0878	.0902	.0925	.0948	.0970	
12	.0505	.0530	.0555	.0579	.0604	.0629	.0654	.0679	.0703	.0728	
13	.0315	.0334	.0354	.0374	.0395	.0416	.0438	.0459	.0481	.0504	
14	.0182	.0196	.0210	.0225	.0240	.0256	.0272	.0289	.0306	.0324	
15	.0098	.0107	.0116	.0126	.0136	.0147	.0158	.0169	.0182	.0194	
16	.0050	.0055	.0060	.0066	.0072	.0079	.0086	.0093	.0101	.0109	
17	.0024	.0026	.0029	.0033	.0036	.0040	.0044	.0048	.0053	.0058	
18	.0011	.0012	.0014	.0015	.0017	.0019	.0021	.0024	.0026	.0029	
19	.0005	.0005	.0006	.0007	.0008	.0009	.0010	.0011	.0012	.0014	
20	.0002	.0002	.0002	.0003	.0003	.0004	.0004	.0005	.0005	.0006	
21	.0001	.0001	.0001	.0001	.0001	.0002	.0002	.0002	.0002	.0003	
22	.0000	.0000	.0000	.0000	.0001	.0001	.0001	.0001	.0001	.0001	
<i>x</i>	λ										
	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	
0	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0000	
1	.0010	.0009	.0009	.0008	.0007	.0007	.0006	.0005	.0005	.0005	
2	.0046	.0043	.0040	.0037	.0034	.0031	.0029	.0027	.0025	.0023	
3	.0140	.0131	.0123	.0115	.0107	.0100	.0093	.0087	.0081	.0076	
4	.0319	.0302	.0285	.0269	.0254	.0240	.0226	.0213	.0201	.0189	
5	.0581	.0555	.0530	.0506	.0483	.0460	.0439	.0418	.0398	.0378	
6	.0881	.0851	.0822	.0793	.0764	.0736	.0709	.0682	.0656	.0631	
7	.1145	.1118	.1091	.1064	.1037	.1010	.0982	.0955	.0928	.0901	
8	.1302	.1286	.1269	.1251	.1232	.1212	.1191	.1170	.1148	.1126	
9	.1317	.1315	.1311	.1306	.1300	.1293	.1284	.1274	.1263	.1251	
10	.1198	.1210	.1219	.1228	.1235	.1241	.1245	.1249	.1250	.1251	
11	.0991	.1012	.1031	.1049	.1067	.1083	.1098	.1112	.1125	.1137	
12	.0752	.0776	.0799	.0822	.0844	.0866	.0888	.0908	.0928	.0948	
13	.0526	.0549	.0572	.0594	.0617	.0640	.0662	.0685	.0707	.0729	
14	.0342	.0361	.0380	.0399	.0419	.0439	.0459	.0479	.0500	.0521	
15	.0208	.0221	.0235	.0250	.0265	.0281	.0297	.0313	.0330	.0347	
16	.0118	.0127	.0137	.0147	.0157	.0168	.0180	.0192	.0204	.0217	
17	.0063	.0069	.0075	.0081	.0088	.0095	.0103	.0111	.0119	.0128	
18	.0032	.0035	.0039	.0042	.0046	.0051	.0055	.0060	.0065	.0071	
19	.0015	.0017	.0019	.0021	.0023	.0026	.0028	.0031	.0034	.0037	

Table C (continued)

x	λ									
	9.1	9.2	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0
20	.0007	.0008	.0009	.0010	.0011	.0012	.0014	.0015	.0017	.0019
21	.0003	.0003	.0004	.0004	.0005	.0006	.0006	.0007	.0008	.0009
22	.0001	.0001	.0002	.0002	.0002	.0002	.0003	.0003	.0004	.0004
23	.0000	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0002	.0002
24	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0001	.0001

x	λ									
	11	12	13	14	15	16	17	18	19	20
0	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
1	.0002	.0001	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2	.0010	.0004	.0002	.0001	.0000	.0000	.0000	.0000	.0000	.0000
3	.0037	.0018	.0008	.0004	.0002	.0001	.0000	.0000	.0000	.0000
4	.0102	.0053	.0027	.0013	.0006	.0003	.0001	.0001	.0000	.0000
5	.0224	.0127	.0070	.0037	.0019	.0010	.0005	.0002	.0001	.0001
6	.0411	.0255	.0152	.0087	.0048	.0026	.0014	.0007	.0004	.0002
7	.0646	.0437	.0281	.0174	.0104	.0060	.0034	.0018	.0010	.0005
8	.0888	.0655	.0457	.0304	.0194	.0120	.0072	.0042	.0024	.0013
9	.1085	.0874	.0661	.0473	.0324	.0213	.0135	.0083	.0050	.0029
10	.1194	.1048	.0859	.0663	.0486	.0341	.0230	.0150	.0095	.0058
11	.1194	.1144	.1015	.0844	.0663	.0496	.0355	.0245	.0164	.0106
12	.1094	.1144	.1099	.0984	.0829	.0661	.0504	.0368	.0259	.0176
13	.0926	.1056	.1099	.1060	.0956	.0814	.0658	.0509	.0378	.0271
14	.0728	.0905	.1021	.1060	.1024	.0930	.0800	.0655	.0514	.0387
15	.0534	.0724	.0885	.0989	.1024	.0992	.0906	.0786	.0650	.0516
16	.0367	.0543	.0719	.0866	.0960	.0992	.0963	.0884	.0772	.0646
17	.0237	.0383	.0550	.0713	.0847	.0934	.0963	.0936	.0863	.0760
18	.0145	.0256	.0397	.0554	.0706	.0830	.0909	.0936	.0911	.0844
19	.0084	.0161	.0272	.0409	.0557	.0699	.0814	.0887	.0911	.0888
20	.0046	.0097	.0177	.0286	.0418	.0559	.0692	.0798	.0866	.0888
21	.0024	.0055	.0109	.0191	.0299	.0426	.0560	.0684	.0783	.0846
22	.0012	.0030	.0065	.0121	.0204	.0310	.0433	.0560	.0676	.0769
23	.0006	.0016	.0037	.0074	.0133	.0216	.0320	.0438	.0559	.0669
24	.0003	.0008	.0020	.0043	.0083	.0144	.0226	.0328	.0442	.0557
25	.0001	.0004	.0010	.0024	.0050	.0092	.0154	.0237	.0336	.0446
26	.0000	.0002	.0005	.0013	.0029	.0057	.0101	.0164	.0246	.0343
27	.0000	.0001	.0002	.0007	.0016	.0034	.0063	.0109	.0173	.0254
28	.0000	.0000	.0001	.0003	.0009	.0019	.0038	.0070	.0117	.0181
29	.0000	.0000	.0001	.0002	.0004	.0011	.0023	.0044	.0077	.0125

Table C		(concluded)								
x	λ									
	11	12	13	14	15	16	17	18	19	20
30	.0000	.0000	.0000	.0001	.0002	.0006	.0013	.0026	.0049	.0083
31	.0000	.0000	.0000	.0000	.0001	.0003	.0007	.0015	.0030	.0054
32	.0000	.0000	.0000	.0000	.0001	.0001	.0004	.0009	.0018	.0034
33	.0000	.0000	.0000	.0000	.0000	.0001	.0002	.0005	.0010	.0020
34	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0002	.0006	.0012
35	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0003	.0007
36	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0002	.0004
37	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001	.0002
38	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001
39	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0001

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