DESCRIPTIVE STATISTICS

Mean and Standard Deviation

Sample mean $= \dfrac{\Sigma fm}{\Sigma f}$

Population standard deviation $= \sqrt{\dfrac{\Sigma fm^2}{\Sigma f} - \left(\dfrac{\Sigma fm}{\Sigma f}\right)^2}$

Sample standard deviation $= \sqrt{\dfrac{\Sigma fm^2 - \dfrac{(\Sigma fm)^2}{\Sigma f}}{\Sigma f - 1}}$

where f = class frequency; m = class midpoint

Median

$$= L + \left[\frac{\frac{1}{2}n - f_s}{f}\right] \times c$$

where L = median class lower bound; f = median class frequency;
c = median class width; n = total number of observations;
f_s = sum of all frequencies before the median class

Mode

$$= L + \left[\frac{f - fb}{(f - fb) + (f - fa)}\right] \times c$$

where L = modal class lower bound; f = modal class frequency;
c = modal class width;
fb = frequency of class before modal class;
fa = frequency of class after modal class

Quartile Deviation

$= \dfrac{Q_3 - Q_1}{2}$ where Q_3 = upper quartile; Q_1 = lower quartile

Pearson Measure of Skewness

$$= \frac{3(\text{mean} - \text{median})}{\text{standard deviation}} \text{ or } \frac{\text{mean} - \text{mode}}{\text{standard deviation}}$$

Coefficient of Variation

$$= \frac{\text{standard deviation}}{\text{mean}} \times 100\%$$

INDEX NUMBERS

	Price	Quantity
Laspeyres	$\frac{\sum P_n Q_o}{\sum P_o Q_o} \times 100$	$\frac{\sum P_o Q_n}{\sum P_o Q_o} \times 100$
Paasche	$\frac{\sum P_n Q_n}{\sum P_o Q_n} \times 100$	$\frac{\sum P_n Q_n}{\sum P_n Q_o} \times 100$

where P_o = base period price; Q_o = base period quantity;
P_n = current period price; Q_n = current period quantity

BINOMIAL DISTRIBUTION

If $X \sim \text{Bin}\,(n, p)$, then $P(X = x) = {}_nC_x p^x q^{n-x}$, $x = 0, 1, 2, \ldots, n$

POISSON DISTRIBUTION

If $X \sim \text{P}_\text{o}(\lambda)$, then $P(X = x) = \dfrac{e^{-\lambda}\lambda^x}{x!}$, $x = 0, 1, 2, \ldots$

SAMPLING DISTRIBUTIONS

Standard Error of a Sample Mean **($\sigma_{\bar{x}}$)**

When population variance is known, $\sigma_{\bar{x}} = \dfrac{\sigma}{\sqrt{n}}$

When population variance is unknown, $\sigma_{\bar{x}} = \dfrac{s}{\sqrt{n}}$

where n = sample size; σ = population standard deviation; s = estimator for σ

Standard Error of a Sample Proportion **(σ_{P_s})**

When π is known, $\sigma_{P_s} = \sqrt{\dfrac{\pi(1-\pi)}{n}}$

When π is unknown, $\sigma_{P_s} = \sqrt{\dfrac{P_s(1-P_s)}{n}}$

where π = population proportion; n = sample size; P_s = sample proportion

CONFIDENCE INTERVAL

When $n \geq 30$, $100(1-\alpha)\%$ confidence interval for θ is $\hat{\theta} \pm Z_{\frac{\alpha}{2}} \mathrm{se}(\hat{\theta})$

When $n < 30$, $100(1-\alpha)\%$ confidence interval for θ is $\hat{\theta} \pm t_{\frac{\alpha}{2}} \mathrm{se}(\hat{\theta})$

where se = standard error

LINEAR REGRESSION ANALYSIS

Linear Regression Equation

$$y = a + bx \quad \text{where} \quad b = \frac{n\Sigma xy - \Sigma x\, \Sigma y}{n\Sigma x^2 - (\Sigma x)^2}; \qquad a = \frac{\Sigma y}{n} - b\frac{\Sigma x}{n}$$

Product Moment Correlation Coefficient

$$r = \frac{n\Sigma xy - \Sigma x\, \Sigma y}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2][n\Sigma y^2 - (\Sigma y)^2]}}$$

CHI-SQUARE TEST

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$ where O = observed frequencies; E = expected frequencies

TEST STATISTICS

For Mean

When population variance is known, $$z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

When population variance is unknown and $n \geq 30$, $$z = \frac{\bar{x} - \mu}{s / \sqrt{n}}$$

When population variance is unknown and n < 30, $$t = \frac{\bar{x} - \mu}{s / \sqrt{n}}$$

where n = sample size; σ = population standard deviation;
μ = population mean; s = estimator for σ;
$\bar{x}$ = sample mean

For Proportion

$$z = \frac{P_s - \pi}{\sqrt{\dfrac{\pi(1 - \pi)}{n}}}$$

where π = population proportion; P_s = sample proportion

For Paired Sample

$$t = \frac{\bar{d}}{s_d / \sqrt{n}}$$

where $\bar{d}$ = the mean of $(x_1 - x_2)$;
s_d = estimator for σ_d;
n = sample size

For Difference of Two Means

When population variances are known,

$$z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \quad \text{for } n_1 \geq 30 \text{ and } n_2 \geq 30$$

When population variances are unknown,

$$z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \quad \text{for } n_1 \geq 30 \text{ and } n_2 \geq 30$$

or $$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}} \quad \text{for } n_1 < 30 \text{ and } n_2 < 30$$

where n_1 = sample size 1; n_2 = sample size 2;
$\bar{x}_1$ = sample mean 1; $\bar{x}_2$ = sample mean 2;
μ_1 = population mean 1; μ_2 = population mean 2;
σ_1^2 = population variance 1; σ_2^2 = population variance 2;
s_1^2 = estimator for σ_1^2; s_2^2 = estimator for σ_2^2;
s_p^2 = pooled estimator for σ^2

$$= \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$$

STOCK CONTROL

Optimal order size, $q = \sqrt{\dfrac{2CD}{H}}$

Number of orders $= \dfrac{D}{q}$

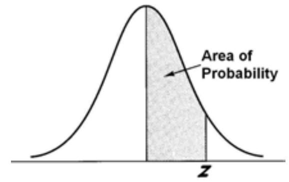
Reorder point $= D \times L$

Cycle time $= \dfrac{\text{working days}}{\text{number of orders}}$

Total cost $= \dfrac{CD}{q} + \dfrac{qH}{2}$

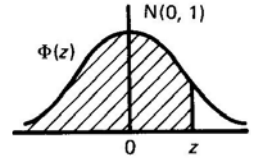
where C = cost per order
D = quantities demanded
H = cost of holding an item in stock
L = lead time

NORMAL CURVE AREAS



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
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998
3.5	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998	0.4998
3.6	0.4998	0.4998	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.7	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.8	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999	0.4999
3.9	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000

THE DISTRIBUTION FUNCTION $\Phi(z)$ OF THE NORMAL DISTRIBUTION N(0, 1)

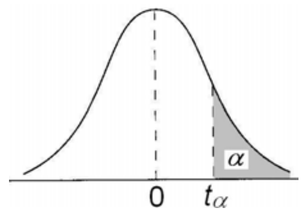


z	0	1	2	3	4	5	6	7	8	9	1	2	3	4	5 ADD	6	7	8	9
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359	4	8	12	16	20	24	28	32	36
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753	4	8	12	16	20	24	28	32	36
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141	4	8	12	15	19	23	27	31	35
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517	4	7	11	15	19	22	26	30	34
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879	4	7	11	14	18	22	25	29	32
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224	3	7	10	14	17	20	24	27	31
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549	3	7	10	13	16	19	23	26	29
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852	3	6	9	12	15	18	21	24	27
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133	3	5	8	11	14	16	19	22	25
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389	3	5	8	10	13	15	18	20	23
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621	2	5	7	9	12	14	16	19	21
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830	2	4	6	8	10	12	14	16	18
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015	2	4	6	7	9	11	13	15	17
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177	2	3	5	6	8	10	11	13	14
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319	1	3	4	6	7	8	10	11	13
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441	1	2	4	5	6	7	8	10	11
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545	1	2	3	4	5	6	7	8	9
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633	1	2	3	4	4	5	6	7	8
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706	1	1	2	3	4	4	5	6	6
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767	1	1	2	2	3	4	4	5	5
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817	0	1	1	2	2	3	3	4	4
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857	0	1	1	2	2	2	3	3	4
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890	0	1	1	1	2	2	2	3	3
2.3	.9893	9896	.9898								0	1	1	1	1	2	2	2	2
				.9901	.99036	.99061	.99086				3	5	8	10	13	15	18	20	23
								.99111	.99134	.99158	2	5	7	9	12	14	16	18	21
2.4	.99180	.99202	.99224	.99245	.99266						2	4	6	8	11	13	15	17	19
						.99286	.99305	.99324	.99343	.99361	2	4	6	7	9	11	13	15	17
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506	.99520	2	3	5	6	8	9	11	12	14
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632	.99643	1	2	3	5	6	7	8	9	10
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728	.99736	1	2	3	4	5	6	7	8	9
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801	.99807	1	1	2	3	4	4	5	6	6
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856	.99861	0	1	1	2	2	3	3	4	4
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99889	.99893	.99896	.99900	0	1	1	2	2	2	3	3	4
3.1	$.9^{3}032$	$.9^{3}065$	$.9^{3}096$								3	6	9	13	16	19	22	25	28
				$.9^{3}126$	$.9^{3}155$	$.9^{3}184$	$.9^{3}211$				3	6	8	11	14	17	20	22	25
								$.9^{3}238$	$.9^{3}264$	$.9^{3}289$	2	5	7	10	12	15	17	20	22
3.2	$.9^{3}313$	$.9^{3}336$	$.9^{3}359$	$.9^{3}381$	$.9^{3}402$						2	4	7	9	11	13	15	18	20
						$.9^{3}423$	$.9^{3}443$	$.9^{3}462$	$.9^{3}481$	$.9^{3}499$	2	4	6	8	9	11	13	15	17
3.3	$.9^{3}517$	$.9^{3}534$	$.9^{3}550$	$.9^{3}566$	$.9^{3}581$						2	3	5	6	8	10	11	13	14
						$.9^{3}596$	$.9^{3}610$	$.9^{3}624$	$.9^{3}638$	$.9^{3}651$	1	3	4	5	7	8	9	10	12
3.4	$.9^{3}663$	$.9^{3}675$	$.9^{3}687$	$.9^{3}698$	$.9^{3}709$	$.9^{3}720$	$.9^{3}730$	$.9^{3}740$	$.9^{3}749$	$.9^{3}758$	1	2	3	4	5	6	7	8	9
3.5	$.9^{3}767$	$.9^{3}776$	$.9^{3}784$	$.9^{3}792$	$.9^{3}800$	$.9^{3}807$	$.9^{3}815$	$.9^{3}822$	$.9^{3}828$	$.9^{3}835$	1	1	2	3	4	4	5	6	7
3.6	$.9^{3}841$	$.9^{3}847$	$.9^{3}853$	$.9^{3}858$	$.9^{3}864$	$.9^{3}869$	$.9^{3}874$	$.9^{3}879$	$.9^{3}883$	$.9^{3}888$	0	1	1	2	2	3	3	4	5
3.7	$.9^{3}892$	$.9^{3}896$	$.9^{3}90$	$.9^{4}04$	$.9^{4}08$	$.9^{4}12$	$.9^{4}15$	$.9^{4}18$	$.9^{4}22$	$.9^{4}250$									
3.8	$.9^{4}28$	$.9^{4}31$	$.9^{4}33$	$.9^{4}36$	$.9^{4}38$	$.9^{4}41$	$.9^{4}43$	$.9^{4}46$	$.9^{4}48$	$.9^{4}500$									
3.9	$.9^{4}52$	$.9^{4}54$	$.9^{4}56$	$.9^{4}58$	$.9^{4}59$	$.9^{4}61$	$.9^{4}63$	$.9^{4}64$	$.9^{4}66$	$.9^{4}670$									

For negative values of z use $\Phi(z) = 1 - \Phi(-z)$

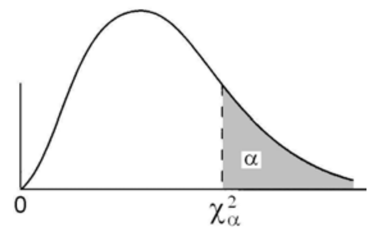
CRITICAL VALUES OF t

df	$t_{0.10}$	$t_{0.05}$	$t_{0.025}$	$t_{0.01}$	$t_{0.005}$
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
35	1.306	1.690	2.030	2.438	2.724
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
60	1.296	1.671	2.000	2.390	2.660
70	1.294	1.667	1.994	2.381	2.648
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
120	1.289	1.658	1.980	2.358	2.617
140	1.288	1.656	1.977	2.353	2.611
160	1.287	1.654	1.975	2.350	2.607
180	1.286	1.653	1.973	2.347	2.603
200	1.286	1.653	1.972	2.345	2.601
inf.	1.282	1.645	1.960	2.326	2.576



CRITICAL VALUES FOR THE CHI-SQUARED DISTRIBUTION

(Values in the table are critical values of the chi-squared random variable for right hand tails of the indicated areas, α.)



ν	α									
	0.995	**0.99**	**0.975**	**0.95**	**0.90**	**0.10**	**0.05**	**0.025**	**0.01**	**0.005**
1	0.0000393	0.0001571	0.0009821	0.0039321	0.0157908	2.70554	3.84146	5.02389	6.63490	7.87944
2	0.010025	0.020100	0.050636	0.102586	0.210721	4.60518	5.99148	7.37778	9.21035	10.59653
3	0.071723	0.114832	0.215795	0.351846	0.584375	6.25139	7.81472	9.34840	11.34488	12.83807
4	0.206984	0.297107	0.484419	0.710724	1.063624	7.77943	9.48773	11.14326	13.27670	14.86017
5	0.411751	0.554297	0.831209	1.145477	1.610309	9.23635	11.0705	12.83249	15.0863	16.7496
6	0.675733	0.872083	1.237342	1.635380	2.204130	10.64464	12.5916	14.44935	16.8119	18.5475
7	0.989251	1.239032	1.689864	2.167349	2.833105	12.01703	14.0671	16.01277	18.4753	20.2777
8	1.344403	1.646506	2.179725	2.732633	3.489537	13.36156	15.5073	17.53454	20.0902	21.9549
9	1.734911	2.087889	2.700389	3.325115	4.168156	14.68366	16.9190	19.02278	21.6660	23.5893
10	2.155845	2.558199	3.246963	3.940295	4.865178	15.98717	18.3070	20.48320	23.2093	25.1881
11	2.603202	3.053496	3.815742	4.574809	5.577788	17.27501	19.6752	21.92002	24.7250	26.7569
12	3.073785	3.570551	4.403778	5.226028	6.303796	18.54934	21.0261	23.33666	26.2170	28.2997
13	3.565042	4.106900	5.008738	5.891861	7.041500	19.81193	22.3620	24.73558	27.6882	29.8193
14	4.074659	4.660415	5.628724	6.570632	7.789538	21.06414	23.6848	26.11893	29.1412	31.3194
15	4.600874	5.229356	6.262123	7.260935	8.546753	22.30712	24.9958	27.48836	30.5780	32.8015
16	5.142164	5.812197	6.907664	7.961639	9.312235	23.54182	26.2962	28.84532	31.9999	34.2671
17	5.697274	6.407742	7.564179	8.671754	10.085183	24.76903	27.5871	30.19098	33.4087	35.7184
18	6.264766	7.014903	8.230737	9.390448	10.864937	25.98942	28.8693	31.52641	34.8052	37.1564
19	6.843923	7.632698	8.906514	10.117006	11.650912	27.20356	30.1435	32.85234	36.1908	38.5821
20	7.433811	8.260368	9.590772	10.850799	12.442601	28.41197	31.4104	34.16958	37.5663	39.9969
21	8.033602	8.897172	10.282907	11.591316	13.239596	29.61509	32.6706	35.47886	38.9322	41.4009
22	8.642681	9.542494	10.982330	12.338009	14.041490	30.81329	33.9245	36.78068	40.2894	42.7957
23	9.260383	10.195689	11.688534	13.090505	14.847954	32.00689	35.1725	38.07561	41.6383	44.1814
24	9.886199	10.856349	12.401146	13.848422	15.658679	33.19624	36.4150	39.36406	42.9798	45.5584
25	10.519647	11.523951	13.119707	14.611396	16.473405	34.38158	37.6525	40.64650	44.3140	46.9280
26	11.160218	12.198177	13.843881	15.379163	17.291880	35.56316	38.8851	41.92314	45.6416	48.2898
27	11.807655	12.878468	14.573373	16.151395	18.113889	36.74123	40.1133	43.19452	46.9628	49.6450
28	12.461281	13.564666	15.307854	16.927876	18.939235	37.91591	41.3372	44.46079	48.2782	50.9936
29	13.121067	14.256406	16.047051	17.708381	19.767740	39.08748	42.5569	45.72228	49.5878	52.3355
30	13.786682	14.953464	16.790756	18.492667	20.599245	40.25602	43.7730	46.97922	50.8922	53.6719
40	20.706577	22.164201	24.433058	26.509296	29.050516	51.80504	55.7585	59.34168	63.6908	66.7660
50	27.990825	29.706725	32.357385	34.764236	37.688637	63.16711	67.5048	71.42019	76.1538	79.4898
60	35.534397	37.484796	40.481707	43.187966	46.458885	74.39700	79.0820	83.29771	88.3794	91.9518
70	43.275305	45.441700	48.757536	51.739263	55.328945	85.52704	90.5313	95.02315	100.4251	104.2148
80	51.171933	53.539983	57.153152	60.391459	64.277842	96.57820	101.8795	106.6285	112.3288	116.3209
90	59.196327	61.754019	65.646592	69.126018	73.291079	107.56501	113.1452	118.1359	124.1162	128.2987
100	67.327533	70.064995	74.221882	77.929442	82.358127	118.49800	124.3421	129.5613	135.8069	140.1697

Revised: 06 June 2007

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