FORMULAE

Probability

$A \cup B = A$ or B $\qquad$ $A \cap B = A$ and B (overlap)

$P(B \mid A) =$ probability of B, given A.

Rules of Addition

If A and B are mutually exclusive: $P(A \cup B) = P(A) + P(B)$

If A and B are not mutually exclusive: $P(A \cap B) = P(A) + P(B) - P(A \cap B)$

Rules of Multiplication

If A and B are independent: $P(A \cap B) = P(A)P(B)$

If A and B are not independent: $P(A \cap B) = P(A)P(B \mid A)$

E(X) = $\sum$ (probability $\times$ payoff)

Quadratic Equations

If $ax^2 + bx + c = 0$ is the general quadratic equation, the two solutions (roots) are given by:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Descriptive Statistics

Arithmetic Mean

$$\bar{x} = \frac{\sum x}{n}, \quad \bar{x} = \frac{\sum fx}{\sum f} \text{ (frequency distribution)}$$

Standard Deviation

$$\text{SD} = \frac{\sqrt{\sum (x - \bar{x})^2}}{N}, \quad \text{SD} = \frac{\sqrt{\sum fx^2 - \bar{x}^2}}{\sum f} \text{ (frequency distribution)}$$

Median

$$\text{m} = L_m + \left(\frac{\frac{n}{2} - F_m}{F_m} \right) c$$

Mode

$$m = L_o + \frac{\Delta_1}{\Delta_1 + \Delta_2}$$

Time Series

Additive Model

Series = Trend + Seasonal + Random

Multiplicative Model

Series = Trend × Seasonal × Random

Linear Regression and Correlation

$$Y = a + bX \text{ or } \overline{Y} = b(X - \overline{X})$$

where

$$b = \frac{Covariance(XY)}{Variance(X)} = \frac{n\sum XY - (\sum X)(\sum Y)}{n\sum X^2 - (\sum X)^2}$$

and

$$a = \overline{Y} - b\overline{X}$$

or solve

$$\sum Y = na + \sum X$$
$$\sum XY = a\sum X + b\sum X^2$$

Coefficient of Correlation

$$r = \frac{Covariance(XY)}{\sqrt{Var(X) \times Var(Y)}} = \frac{n\sum XY - (\sum X)(\sum Y)}{\sqrt{\{n\sum X^2 - (\sum X)^2\}\{n\sum Y^2 - (\sum (Y)^2\}}}$$

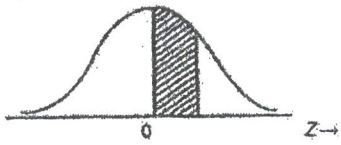
R(rank) = 1 - $\frac{6\sum d^2}{n(n^2-1)}$

Stocks

$$EOQ = \sqrt{\frac{2C_0 D}{C_n}}$$

AREA UNDER THE NORMAL CURVE

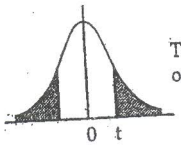
This table gives the area under the normal curve between the mean and a point Z standard deviations above the mean. The corresponding area for deviations below the mean can be found by symmetry.



$Z = \frac{(x-\mu)}{\sigma}$	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.0000	.0040	.0080	.0120	.0159	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2518	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4430	.4441
1.6	.4452	.4463	.4474	.4485	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4762	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4865	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4980	.4980	.4981
2.9	.4981	.4982	.4983	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.49865	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.49903	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.49931	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.49952	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.49966	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.49977									

Percentage points of the t distribution.

The table gives the values for the area in both tails.



The table shows the total of the shaded areas

Degrees of freedom	Area in both tables combined			
	.10	.05	.02	.01
v = 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	1.493	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
v = 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	1.701	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
12	1.658	1.980	2.358	2.6170
∞	1.645	1.960	2.326	2.576

Percentage points of the f distibution.

v_1 = Degrees of freedom for numerator

v_2 = Degrees of freedom for numerator	1	2	3	4	5	6	7	8	9	10	11	12
1	161	200	216	225	230	234	237	239	241	242	243	244
	(4,052)	(4,999)	(5,403)	(5,625)	(5,764)	(5,859)	(5,928)	(5,981)	(6,022)	(6,056)	(6,082)	(6,106)
2	18.51	19.00	19.16	19.25	19.30	19.33	19.36	19.37	19.38	19.39	19.40	19.41
	(98.49)	(99.01)	(99.17)	(99.25)	(99.30)	(99.33)	(99.34)	(99.36)	(99.38)	(99.40)	(99.41)	(99.42)
3	10.13	9.55	9.28	9.12	9.01	8.94	8.88	8.84	8.81	8.78	8.76	8.74
	(34.12)	(30.81)	(29.46)	(28.71)	(28.24)	(27.91)	(27.67)	(27.49)	(27.34)	(27.23)	(27.13)	(27.05)
4	7.71	6.94	6.59	6.39	6.26	6.16	6.09	6.04	6.00	5.96	5.93	5.91
	(21.20)	(18.00)	(16.69)	(15.98)	(15.52)	(15.21)	(14.98)	(14.80)	(15.68)	(14.64)	(14.45)	(14.37)
5	6.61	5.79	5.41	5.19	5.05	4.95	4.88	4.82	4.78	4.74	4.70	4.68
	(16.26)	(13.27)	(12.06)	(11.39)	(10.97)	(10.67)	(10.45)	(10.27)	(10.15)	(10.05)	(9.98)	(9.89)
6	5.99	5.14	4.76	4.53	4.39	4.28	4.21	4.15	4.10	4.06	4.03	4.00
	(13.75)	(10.92)	(9.78)	(9.15)	(8.75)	(8.47)	(8.26)	(8.10)	(7.98)	(7.87)	(7.79)	(7.72)
7	5.59	4.74	4.35	4.12	3.97	3.87	3.79	3.73	3.68	3.63	3.60	3.57
	(12.25)	(9.55)	(8.45)	(7.85)	(7.46)	(7.19)	(7.00)	(6.84)	(6.71)	(6.62)	(6.54)	(6.47)
8	5.32	4.46	4.07	3.84	3.69	3.58	3.50	3.44	3.39	3.34	3.31	3.28
	(11.26)	(8.65)	(7.59)	(7.01)	(6.93)	(6.37)	(6.19)	(6.08)	(5.91)	(5.82)	(5.74)	(5.67)
9	5.12	4.26	3.83	3.63	3.48	3.37	3.29	3.23	3.18	3.13	3.10	3.07
	(10.56)	(8.02)	(6.99)	(6.42)	(6.06)	(5.80)	(5.62)	(5.47)	(5.35)	(5.38)	(5.18)	(5.11)
10	4.96	4.10	3.71	3.48	3.33	3.22	3.14	3.07	3.02	2.97	2.94	2.91
	(10.04)	(7.58)	(6.55)	(5.99)	(5.64)	(5.39)	(5.21)	(5.06)	(4.93)	(4.85)	(4.76)	(4.71)
11	4.84	3.98	3.59	3.36	3.20	3.09	3.01	2.95	2.90	2.86	2.82	2.79
	(9.65)	(7.20)	(6.22)	(5.67)	(5.32)	(5.07)	(4.88)	(4.74)	(4.63)	(4.54)	(4.46)	(4.40)
12	4.75	3.88	3.49	3.26	3.11	3.00	2.92	2.85	2.80	2.70	2.73	2.69
	(9.33)	(6.93)	(5.95)	(5.41)	(5.06)	(4.82)	(4.65)	(4.50)	(4.39)	(4.30)	(4.23)	(4.18)

Values of f:

Right tail of the distribution for P = .05

Right tail of the distribution for P = .01 (in brackets).