STATISTICS AND PROBABILITY FORMULAS

1. Sample mean: $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$

2. Sample variance: $s^2 = \frac{\sum_{i=1}^{n} x_i^2 - n\left(\bar{x}^2\right)}{n-1}$

3. Sample standard deviation: $s = \sqrt{s^2}$

4. General addition rule: $P(A \text{ or } B) = P(A \cup B) = P(A) + P(B) - P(A \cap B)$

5. Conditional probability: $P(A \mid B) = \frac{P(A \cap B)}{P(B)}$

6. General multiplication rule: $P(A \text{ and } B) = P(A \cap B) = P(B) \cdot P(A \mid B) = P(A) \cdot P(B \mid A)$

7. Converting to standard units: $z = \frac{x - \mu}{\sigma}$ or $z = \frac{x - \bar{x}}{s}$

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

9. Large sample confidence interval for the population mean μ: $\bar{x} \pm z_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$

10. Small sample confidence interval for the population mean μ: $\bar{x} \pm t_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$

    The t-distribution has $n - 1$ degrees of freedom.

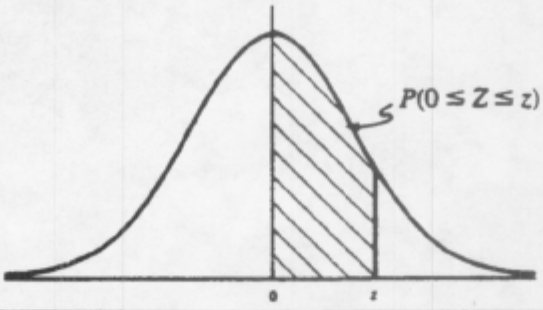
11. Statistic for test concerning the population mean, where $\mu = \mu_0$ (large sample):

    $z = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$

12. Statistic for test concerning the population mean, where $\mu = \mu_0$ (small sample):

    $t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$. The t-distribution has $n - 1$ degrees of freedom.

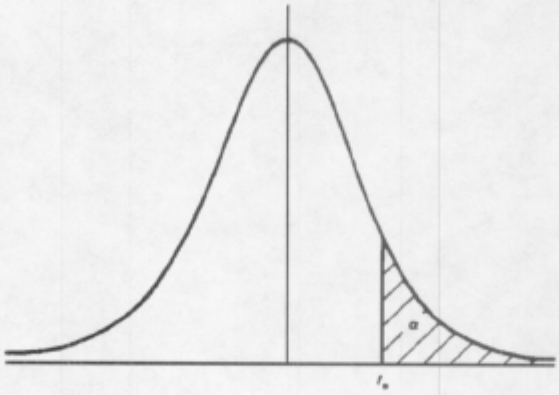
TABLE 4: Probabilities for the Standard Normal Distribution



	Second decimal phase in z									
z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
.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	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.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	.4761	.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	.4864	.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	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4497	.4997	.4997	.4997	.4997	.4997	.4997	.4998

From Harcourt Brace Javanovich College Outline Series Statistics II: Estimation and Tests of Hypothesis by Elliot A. Tanis, Books for Professionals, Inc., 1987.

TABLE 6: Student's t Critical Values*



	α					
r	.25	.10	.05	.025	.01	.005
1	1.000	3.08	6.31	12.7	31.8	63.7
2	.816	1.89	2.92	4.30	6.97	9.92
3	.765	1.64	2.35	3.18	4.54	5.84
4	.741	1.53	2.13	2.78	3.75	4.60
5	.727	1.48	2.02	2.57	3.37	4.03
6	.718	1.44	1.94	2.45	3.14	3.71
7	.711	1.42	1.89	2.36	3.00	3.50
8	.706	1.40	1.86	2.31	2.90	3.36
9	.703	1.38	1.83	2.26	2.82	3.25
10	.700	1.37	1.81	2.23	2.76	3.17
11	.697	1.36	1.80	2.20	2.72	3.11
12	.695	1.36	1.78	2.18	2.68	3.05
13	.694	1.35	1.77	2.16	2.65	3.01
14	.692	1.35	1.76	2.14	2.62	2.98
15	.691	1.34	1.75	2.13	2.60	2.95
16	.690	1.34	1.75	2.12	2.58	2.92
17	.689	1.33	1.74	2.11	2.57	2.90
18	.688	1.33	1.73	2.10	2.55	2.88
19	.688	1.33	1.73	2.09	2.54	2.86
20	.687	1.33	1.72	2.09	2.53	2.85
21	.686	1.32	1.72	2.08	2.52	2.83
22	.686	1.32	1.72	2.07	2.51	2.82
23	.685	1.32	1.71	2.07	2.50	2.81
24	.685	1.32	1.71	2.06	2.49	2.80
25	.684	1.32	1.71	2.06	2.49	2.79
26	.684	1.32	1.71	2.06	2.48	2.78
27	.684	1.31	1.70	2.05	2.47	2.77
28	.683	1.31	1.70	2.05	2.47	2.76
29	.683	1.31	1.70	2.05	2.46	2.76
z_α	.674	1.28	1.645	1.96	2.33	2.58

* For df $\geq$ 30, the critical value t_α is approximated by z_α, given in the bottom row of table.

From Harcourt Brace Javanovich College Outline Series Statistics II: Estimation and Tests of Hypothesis by Elliot A. Tanis, Books for Professionals, Inc., 1987.