Disclaimer

Formulas and Tables

Chapter 3 – Organizing Data

- Relative Frequency: $\frac{\text{frequency}}{\text{n}}$

Chapter 4 – Summarizing Data

- Population Mean: $\mu = \frac{\sum x}{N}$
- Sample Mean: $\bar{x} = \frac{\sum x}{n}$
- Range: Maximum value – Minimum value
- Population Variance: $\sigma^2 = \frac{\sum (x-\mu)^2}{N}$
- Sample Variance: $s^2 = \frac{\sum (x-\bar{x})^2}{n-1}$
- Population Standard Deviation: $\sigma = \sqrt{\sigma^2}$
- Sample Standard Deviation: $s = \sqrt{s^2}$
- Sample z-score: $z = \frac{x-\bar{x}}{s}$
- p^{th} Percentile: 1) Order data from least to greatest.
  2) $c = \frac{np}{100}$
- Interquartile Range: IQR = $Q_3 - Q_1$

- Outliers: greater than $Q_3 + 1.5(IQR)$
  less than $Q_1 - 1.5(IQR)$

- Five-Number Summary:
  min Q_1 med Q_3 max

Chapter 5 – Probability

- Classical Probability:
$$P(E) = \frac{\text{count of outcomes in E}}{\text{count of all possible outcomes}}$$

- Empirical Probability: $P(E) = \frac{\text{frequency}}{\text{sample size}}$

- Complement Rule: $P(\bar{E}) = 1 - P(E)$

- Addition Rule (Mutually Exclusive Events):
$$P(\text{A or B}) = P(A) + P(B)$$

- Addition Rule (Non-Mutually Exclusive Events):
$$P(\text{A or B}) = P(A) + P(B) - P(\text{A and B})$$

- Multiplication Rule (Independent Events):
$$P(\text{A and B}) = P(A) \times P(B)$$

- Multiplication Rule (Dependent Events):
$$P(\text{A and B}) = P(A) \times P(B|A)$$

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

- Fundamental Counting Rule: $k \times l \times m \ldots$

- Factorial Rule: $n!$

- Permutation Rule: $${}_nP_r = \frac{n!}{(n-r)!}$$

- Combination Rule: $${}_nC_r = \frac{n!}{(n-r)!r!}$$

Chapter 6 –Probability Distributions

- Mean of a Discrete Random Variable:
  $$\mu = \sum\left[x \cdot P(x)\right]$$

- Variance of a Discrete Random Variable:
  $$\sigma^2 = \sum\left[x^2 \cdot P(x)\right] - \mu^2$$

- Standard Deviation of a Discrete Random Variable:
  $$\sigma = \sqrt{\sigma^2}$$

- Binomial Probability:
  $$P(X = x) = {}_nC_x \cdot p^x \cdot q^{(n-x)}$$

- Standard Normal Z-score: $$z = \frac{x - \mu}{\sigma}$$

- Standard Normal Z-score for the Mean: $$z = \frac{\bar{x} - \mu}{\sigma/\sqrt{n}}$$

Chapter 7 – Confidence Intervals

- Z-Interval: $$\bar{x} \pm z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

- T-Interval: $\bar{x} \pm t_{\alpha/2}\left(\frac{s}{\sqrt{n}}\right)$ df = $n-1$

- Proportion Z-Interval:
  $\hat{p} \pm z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{n}}$ where $\hat{p}=\frac{x}{n}$ $\hat{q}=1-\hat{p}$

- Sample Size Formula for a Population Mean:
  $n=\left(\frac{z_{\alpha/2}\sigma}{E}\right)^2$

- Sample Size Formula for a Population Proportion:
  $n=\hat{p}\hat{q}\left(\frac{z_{\alpha/2}}{E}\right)^2$

Chapter 8 – Hypothesis Testing

- Test Statistic for a Z-Test: $z=\frac{\bar{x}-\mu}{\sigma/\sqrt{n}}$

- Test Statistic for a T-Test: $t=\frac{\bar{x}-\mu}{s/\sqrt{n}}$ df = $n-1$

- Test Statistic for a Proportion Z-Test: $z=\frac{\hat{p}-p}{\sqrt{\frac{pq}{n}}}$

Chapter 9 – Inferences for Two Samples

- Test Statistic for Testing the Difference Between Two Population Means (Independent Samples):

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

df = the smaller of $n_1 - 1$ or $n_2 - 1$

- Confidence Interval for the Difference Between Two Population Means (Independent Samples):

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

df = the smaller of $n_1 - 1$ or $n_2 - 1$

- Test Statistic for Testing the Population Mean Difference (Dependent Samples):

$$t = \frac{\bar{D} - \mu}{s_D / \sqrt{n}} \qquad \text{df} = n - 1$$

- Confidence Interval for the Population Mean Difference (Dependent Samples):

$$\bar{D} \pm t_{\alpha/2}\left(\frac{s_D}{\sqrt{n}}\right) \quad \text{df} = n - 1$$

- Test Statistic for Testing the Difference Between Two Population Proportions:

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

where $\bar{p} = \dfrac{x_1 + x_2}{n_1 + n_2}$ $\bar{q} = 1 - \bar{p}$

$\hat{p}_1 = \dfrac{x_1}{n_1}$ $\hat{p}_2 = \dfrac{x_2}{n_2}$

- Confidence Interval for the Difference Between Two Population Proportions:

$$\left(\hat{p}_1 - \hat{p}_2\right) \pm z_{\alpha/2}\sqrt{\frac{\hat{p}_1\hat{q}_1}{n_1} + \frac{\hat{p}_2\hat{q}_2}{n_2}}$$

Chapter 10 – Correlation and Regression

- Correlation Coefficient:

$$r = \frac{n\left(\sum xy\right) - \left(\sum x\right)\left(\sum y\right)}{\sqrt{n\left(\sum x^2\right) - \left(\sum x\right)^2}\sqrt{n\left(\sum y^2\right) - \left(\sum y\right)^2}}$$

- Test Statistic for Testing a Population Correlation Coefficient:

$t = r\sqrt{\dfrac{n-2}{1-r^2}}$ df = $n - 2$

- Equation of a Least-Squares Regression Line:

$\hat{y} = b_0 + b_1 x$

where $b_1 = \dfrac{n\left(\sum xy\right) - \left(\sum x\right)\left(\sum y\right)}{n\left(\sum x^2\right) - \left(\sum x\right)^2}$

$b_0 = \dfrac{\sum y - b_1\left(\sum x\right)}{n}$

- Equation of a Least-Squares Regression Line:
  $\hat{y} = b_0 + b_1 x$

  where $b_1 = r\left(\frac{s_y}{s_x}\right)$ $\qquad b_0 = \bar{y} - b_1\bar{x}$

- Coefficient of Determination:
  $r^2 = (r)^2 = \frac{\text{explained variation}}{\text{total variation}}$

- Standard Error of Estimate:
  $s_e = \sqrt{\frac{\sum y^2 - b_0\left(\sum y\right) - b_1\left(\sum xy\right)}{n-2}}$

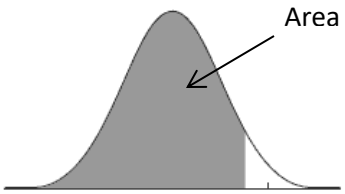
Chapter 11 – Chi-Square and F-Distributions

- Test Statistic for X^2 Test of Independence:
  $\chi^2 = \sum \frac{(O-E)^2}{E}$ $\qquad$ df = $(r-1)(c-1)$

- Test Statistic for ANOVA:
  $F = \frac{MS_B}{MS_W}$ $\qquad$ DFn = $k-1$, DFd = $N-k$

Disclaimer: The formulas used in statistics can vary from textbook to textbook. Nonetheless, the underlying fundamental theory is the same. Thus, many formulas can be used to compute the same concept. If the formulas you observe here are different from the formulas you have seen before, don't fret!! The formulas seen here can indeed be used to compute the concept of interest.

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

z	.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

t-distribution

	Confidence Level							
	20%	50%	80%	90%	95%	98%	99%	99.9%
	Total Area in Two Tails							
	0.80	0.50	0.20	0.10	0.05	0.02	0.01	0.001
	Area in One Tail							
df	0.40	0.25	0.10	0.05	0.025	0.01	0.005	0.0005
1	0.324920	1.000000	3.077684	6.313752	12.70620	31.82052	63.65674	636.6192
2	0.288675	0.816497	1.885618	2.919986	4.30265	6.96456	9.92484	31.5991
3	0.276671	0.764892	1.637744	2.353363	3.18245	4.54070	5.84091	12.9240
4	0.270722	0.740697	1.533206	2.131847	2.77645	3.74695	4.60409	8.6103
5	0.267181	0.726687	1.475884	2.015048	2.57058	3.36493	4.03214	6.8688
6	0.264835	0.717558	1.439756	1.943180	2.44691	3.14267	3.70743	5.9588
7	0.263167	0.711142	1.414924	1.894579	2.36462	2.99795	3.49948	5.4079
8	0.261921	0.706387	1.396815	1.859548	2.30600	2.89646	3.35539	5.0413
9	0.260955	0.702722	1.383029	1.833113	2.26216	2.82144	3.24984	4.7809
10	0.260185	0.699812	1.372184	1.812461	2.22814	2.76377	3.16927	4.5869
11	0.259556	0.697445	1.363430	1.795885	2.20099	2.71808	3.10581	4.4370
12	0.259033	0.695483	1.356217	1.782288	2.17881	2.68100	3.05454	4.3178
13	0.258591	0.693829	1.350171	1.770933	2.16037	2.65031	3.01228	4.2208
14	0.258213	0.692417	1.345030	1.761310	2.14479	2.62449	2.97684	4.1405
15	0.257885	0.691197	1.340606	1.753050	2.13145	2.60248	2.94671	4.0728
16	0.257599	0.690132	1.336757	1.745884	2.11991	2.58349	2.92078	4.0150
17	0.257347	0.689195	1.333379	1.739607	2.10982	2.56693	2.89823	3.9651
18	0.257123	0.688364	1.330391	1.734064	2.10092	2.55238	2.87844	3.9216
19	0.256923	0.687621	1.327728	1.729133	2.09302	2.53948	2.86093	3.8834
20	0.256743	0.686954	1.325341	1.724718	2.08596	2.52798	2.84534	3.8495
21	0.256580	0.686352	1.323188	1.720743	2.07961	2.51765	2.83136	3.8193
22	0.256432	0.685805	1.321237	1.717144	2.07387	2.50832	2.81876	3.7921
23	0.256297	0.685306	1.319460	1.713872	2.06866	2.49987	2.80734	3.7676
24	0.256173	0.684850	1.317836	1.710882	2.06390	2.49216	2.79694	3.7454
25	0.256060	0.684430	1.316345	1.708141	2.05954	2.48511	2.78744	3.7251
26	0.255955	0.684043	1.314972	1.705618	2.05553	2.47863	2.77871	3.7066
27	0.255858	0.683685	1.313703	1.703288	2.05183	2.47266	2.77068	3.6896
28	0.255768	0.683353	1.312527	1.701131	2.04841	2.46714	2.76326	3.6739
29	0.255684	0.683044	1.311434	1.699127	2.04523	2.46202	2.75639	3.6594
30	0.255605	0.682756	1.310415	1.697261	2.04227	2.45726	2.75000	3.6460
z	0.253347	0.674490	1.281552	1.644854	1.95996	2.32635	2.57583	3.2905

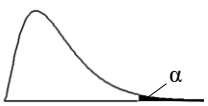
One Tail

Confidence Interval

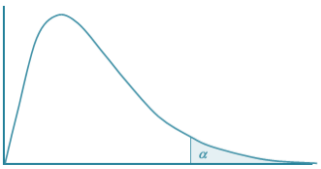
Two Tails

Chi-square Distribution

Level of Significance (α)										
df	**0.995**	**0.990**	**0.975**	**0.950**	**0.900**	**0.100**	**0.050**	**0.025**	**0.010**	**0.005**
1	0.0000	0.0001	0.0010	0.0039	0.0158	2.7055	3.8415	5.0239	6.6349	7.87944
2	0.0100	0.0201	0.0506	0.1025	0.2107	4.6052	5.9915	7.3778	9.2103	10.5966
3	0.0717	0.1148	0.2158	0.3519	0.5844	6.2514	7.8147	9.3484	11.3448	12.8381
4	0.2070	0.2971	0.4844	0.7107	1.0636	7.7794	9.4877	11.1433	13.2767	14.86026
5	0.4117	0.5543	0.8312	1.1455	1.6103	9.2364	11.0705	12.8325	15.0863	16.74960
6	0.6757	0.8720	1.2373	1.6354	2.2041	10.6446	12.5916	14.4494	16.8119	18.54758
7	0.9893	1.2390	1.6899	2.1674	2.8331	12.0170	14.0671	16.0128	18.4753	20.27774
8	1.3444	1.6465	2.1797	2.7326	3.4895	13.3616	15.5073	17.5346	20.0902	21.95495
9	1.7349	2.0879	2.7004	3.3251	4.1682	14.6837	16.9190	19.0228	21.6660	23.58935
10	2.1559	2.5582	3.2470	3.9403	4.8652	15.9872	18.3070	20.4832	23.2093	25.18818
11	2.6032	3.0535	3.8158	4.5748	5.5778	17.2750	19.6751	21.9201	24.7250	26.75685
12	3.0738	3.5706	4.4038	5.2260	6.3038	18.5494	21.0261	23.3367	26.2170	28.29952
13	3.5650	4.1069	5.0088	5.8919	7.0415	19.8119	22.3620	24.7356	27.6883	29.81947
14	4.0747	4.6604	5.6287	6.5706	7.7895	21.0641	23.6848	26.1190	29.1412	31.31935
15	4.6009	5.2294	6.2621	7.2609	8.5468	22.3071	24.9958	27.4884	30.5779	32.80132
16	5.1422	5.8122	6.9077	7.9617	9.3122	23.5418	26.2962	28.8454	31.9999	34.26719
17	5.6972	6.4078	7.5642	8.6718	10.0852	24.7690	27.5871	30.1910	33.4087	35.71847
18	6.2648	7.0149	8.2308	9.3905	10.8649	25.9894	28.8693	31.5264	34.8053	37.15645
19	6.8440	7.6327	8.9065	10.1170	11.6509	27.2036	30.1435	32.8523	36.1909	38.58226
20	7.4338	8.2604	9.5908	10.8508	12.4426	28.4120	31.4104	34.1696	37.5662	39.99685
21	8.0337	8.8972	10.2829	11.5913	13.2396	29.6151	32.6706	35.4789	38.9322	41.40106
22	8.6427	9.5425	10.9823	12.3380	14.0415	30.8132	33.9244	36.7807	40.2894	42.79565
23	9.2604	10.1957	11.6886	13.0905	14.8480	32.0069	35.1725	38.0756	41.6384	44.18128
24	9.8862	10.8564	12.4012	13.8484	15.6587	33.1962	36.4150	39.3641	42.9798	45.55851
25	10.5197	11.5240	13.1197	14.6114	16.4734	34.3816	37.6525	40.6465	44.3141	46.92789
26	11.1602	12.1982	13.8439	15.3792	17.2919	35.5632	38.8851	41.9232	45.6417	48.28988
27	11.8076	12.8785	14.5734	16.1514	18.1139	36.7412	40.1133	43.1945	46.9629	49.64492
28	12.4613	13.5647	15.3079	16.9279	18.9392	37.9159	41.3371	44.4608	48.2782	50.99338
29	13.1212	14.2565	16.0471	17.7084	19.7677	39.0875	42.5570	45.7223	49.5879	52.33562
30	13.7867	14.9535	16.7908	18.4927	20.5992	40.2560	43.7730	46.9792	50.8922	53.6720
40	20.707	22.164	24.433	26.509	29.051	51.805	55.758	59.342	63.691	66.766
50	27.991	29.707	32.357	34.764	37.689	63.167	67.505	71.420	76.154	79.490
60	35.534	37.485	40.482	43.188	46.459	74.397	79.082	83.298	88.379	91.952
70	43.275	45.442	48.758	51.739	55.329	85.527	90.531	95.023	100.425	104.215
80	51.172	53.540	57.153	60.391	64.278	96.578	101.879	106.629	112.329	116.321
90	59.196	61.754	65.647	69.126	73.291	107.565	113.145	118.136	124.116	128.299
100	67.328	70.065	74.222	77.929	82.358	118.498	124.342	129.561	135.807	140.169



F-Distribution



α = 0.10										
	DFn									
DFd	1	2	3	4	5	7	10	15	20	30
1	39.864	49.500	53.593	55.833	57.240	58.906	60.195	61.220	61.740	62.265
2	8.5264	8.9999	9.1618	9.2434	9.2926	9.3491	9.3915	9.4248	9.4413	9.4580
3	5.5384	5.4624	5.3907	5.3426	5.3092	5.2661	5.2304	5.2003	5.1845	5.1681
4	4.5448	4.3245	4.1909	4.1073	4.0505	3.9790	3.9198	3.8704	3.8443	3.8175
5	4.0605	3.7798	3.6194	3.5202	3.4530	3.3679	3.2974	3.2379	3.2067	3.1740
7	3.5895	3.2575	3.0740	2.9605	2.8833	2.7850	2.7025	2.6322	2.5947	2.5555
10	3.2850	2.9244	2.7277	2.6054	2.5216	2.4139	2.3226	2.2434	2.2007	2.1554
15	3.0731	2.6951	2.4898	2.3615	2.2729	2.1582	2.0593	1.9722	1.9243	1.8727
20	2.9746	2.5893	2.3801	2.2490	2.1582	2.0397	1.9368	1.8450	1.7939	1.7383
30	2.8808	2.4887	2.2761	2.1423	2.0493	1.9269	1.8195	1.7222	1.6674	1.6064
60	2.7911	2.3932	2.1774	2.0409	1.9457	1.8194	1.7070	1.6034	1.5435	1.4756
120	2.7478	2.3473	2.1300	1.9924	1.8959	1.7675	1.6523	1.5450	1.4821	1.4094
500	2.7157	2.3132	2.0947	1.9561	1.8588	1.7288	1.6115	1.5009	1.4354	1.3583
1000	2.7106	2.3080	2.0892	1.9505	1.8530	1.7228	1.6051	1.4941	1.4281	1.3501

α = 0.05										
	DFn									
DFd	1	2	3	4	5	7	10	15	20	30
1	161.45	199.50	215.71	224.58	230.16	236.77	241.88	245.95	248.01	250.10
2	18.513	19.000	19.164	19.247	19.296	19.353	19.396	19.429	19.446	19.462
3	10.128	9.5522	9.2766	9.1172	9.0135	8.8867	8.7855	8.7028	8.6602	8.6165
4	7.7086	6.9443	6.5915	6.3882	6.2560	6.0942	5.9644	5.8579	5.8026	5.7458
5	6.6078	5.7862	5.4095	5.1922	5.0504	4.8759	4.7351	4.6187	4.5582	4.4958
7	5.5914	4.7375	4.3469	4.1202	3.9715	3.7871	3.6366	3.5108	3.4445	3.3758
10	4.9645	4.1028	3.7082	3.4780	3.3259	3.1354	2.9782	2.8450	2.7741	2.6996
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7066	2.5437	2.4035	2.3275	2.2467
20	4.3512	3.4928	3.0983	2.8660	2.7109	2.5140	2.3479	2.2032	2.1241	2.0391
30	4.1709	3.3159	2.9223	2.6896	2.5336	2.3343	2.1646	2.0149	1.9317	1.8408
60	4.0012	3.1505	2.7581	2.5252	2.3683	2.1666	1.9927	1.8365	1.7480	1.6492
120	3.9201	3.0718	2.6802	2.4473	2.2898	2.0868	1.9104	1.7505	1.6587	1.5544
500	3.8601	3.0137	2.6227	2.3898	2.2320	2.0278	1.8496	1.6864	1.5917	1.4820
1000	3.8508	3.0047	2.6137	2.3808	2.2230	2.0187	1.8402	1.6765	1.5811	1.4705

α = 0.01										
	DFn									
DFd	1	2	3	4	5	7	10	15	20	30
1	4052.2	4999.5	5403.4	5624.6	5763.6	5928.4	6055.8	6157.3	6208.7	6260.6
2	98.503	99.000	99.166	99.249	99.299	99.356	99.399	99.433	99.449	99.466
3	34.116	30.817	29.457	28.710	28.237	27.672	27.229	26.872	26.690	26.504
4	21.198	18.000	16.694	15.977	15.522	14.976	14.546	14.198	14.020	13.838
5	16.258	13.274	12.060	11.392	10.967	10.455	10.051	9.7222	9.5526	9.3793
7	12.246	9.5467	8.4513	7.8466	7.4605	6.9929	6.6201	6.3143	6.1554	5.9920
10	10.044	7.5594	6.5523	5.9944	5.6363	5.2001	4.8492	4.5582	4.4055	4.2469
15	8.6831	6.3588	5.4169	4.8932	4.5557	4.1416	3.8049	3.5223	3.3719	3.2141
20	8.0960	5.8489	4.9382	4.4306	4.1027	3.6987	3.3682	3.0880	2.9377	2.7785
30	7.5624	5.3903	4.5098	4.0179	3.6990	3.3046	2.9791	2.7002	2.5486	2.3859
60	7.0771	4.9774	4.1259	3.6491	3.3388	2.9530	2.6318	2.3522	2.1978	2.0284
120	6.8509	4.7865	3.9490	3.4795	3.1736	2.7918	2.4720	2.1914	2.0345	1.8600
500	6.6858	4.6479	3.8210	3.3569	3.0539	2.6751	2.3564	2.0746	1.9152	1.7353
1000	6.6603	4.6264	3.8012	3.3379	3.0356	2.6571	2.3387	2.0564	1.8967	1.7158

α = 0.005										
	DFn									
DFd	1	2	3	4	5	7	10	15	20	30
1	16211	19999	21615	22500	23056	23715	24224	24630	24836	25044
2	198.50	199.00	199.17	199.25	199.30	199.36	199.40	199.43	199.45	199.47
3	55.552	49.799	47.467	46.195	45.392	44.434	43.686	43.085	42.777	42.466
4	31.333	26.284	24.259	23.155	22.456	21.622	20.967	20.438	20.167	19.891
5	22.785	18.314	16.530	15.556	14.940	14.200	13.618	13.146	12.903	12.656
7	16.235	12.404	10.882	10.050	9.5221	8.8853	8.3803	7.9677	7.7539	7.5345
10	12.826	9.4270	8.0807	7.3428	6.8723	6.3025	5.8467	5.4706	5.2740	5.0705
15	10.798	7.7007	6.4760	5.8029	5.3721	4.8473	4.4235	4.0697	3.8826	3.6868
20	9.9439	6.9865	5.8176	5.1744	4.7616	4.2569	3.8470	3.5020	3.3178	3.1234
30	9.1796	6.3547	5.2387	4.6233	4.2275	3.7416	3.3439	3.0058	2.8231	2.6277
60	8.4946	5.7950	4.7290	4.1399	3.7599	3.2911	2.9042	2.5705	2.3872	2.1874
120	8.1789	5.5393	4.4972	3.9207	3.5482	3.0874	2.7052	2.3728	2.1882	1.9840
500	7.9498	5.3548	4.3304	3.7632	3.3963	2.9414	2.5625	2.2303	2.0441	1.8352
1000	7.9145	5.3265	4.3049	3.7391	3.3731	2.9191	2.5406	2.2084	2.0219	1.8121