T-table, z table, f table, etc:
F dist

	DF1	α = 0.10																	
DF2	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	Inf
1	39.863	49.5	53.593	55.833	57.24	58.204	58.906	59.439	59.858	60.195	60.705	61.22	61.74	62.002	62.265	62.529	62.794	63.061	63.328
2	8.5263	9	9.1618	9.2434	9.2926	9.3255	9.3491	9.3668	9.3805	9.3916	9.4081	9.4247	9.4413	9.4496	9.4579	9.4662	9.4746	9.4829	9.4912
3	5.5383	5.4624	5.3908	5.3426	5.3092	5.2847	5.2662	5.2517	5.24	5.2304	5.2156	5.2003	5.1845	5.1764	5.1681	5.1597	5.1512	5.1425	5.1337
4	4.5448	4.3246	4.1909	4.1073	4.0506	4.0098	3.979	3.9549	3.9357	3.9199	3.8955	3.8704	3.8443	3.831	3.8174	3.8036	3.7896	3.7753	3.7607
5	4.0604	3.7797	3.6195	3.5202	3.453	3.4045	3.3679	3.3393	3.3163	3.2974	3.2682	3.238	3.2067	3.1905	3.1741	3.1573	3.1402	3.1228	3.105
6	3.776	3.4633	3.2888	3.1808	3.1075	3.0546	3.0145	2.983	2.9577	2.9369	2.9047	2.8712	2.8363	2.8183	2.8	2.7812	2.762	2.7423	2.7222
7	3.5894	3.2574	3.0741	2.9605	2.8833	2.8274	2.7849	2.7516	2.7247	2.7025	2.6681	2.6322	2.5947	2.5753	2.5555	2.5351	2.5142	2.4928	2.4708
8	3.4579	3.1131	2.9238	2.8064	2.7265	2.6683	2.6241	2.5894	2.5612	2.538	2.502	2.4642	2.4246	2.4041	2.383	2.3614	2.3391	2.3162	2.2926
9	3.3603	3.0065	2.8129	2.6927	2.6106	2.5509	2.5053	2.4694	2.4403	2.4163	2.3789	2.3396	2.2983	2.2768	2.2547	2.232	2.2085	2.1843	2.1592
10	3.285	2.9245	2.7277	2.6053	2.5216	2.4606	2.414	2.3772	2.3473	2.3226	2.2841	2.2435	2.2007	2.1784	2.1554	2.1317	2.1072	2.0818	2.0554
11	3.2252	2.8595	2.6602	2.5362	2.4512	2.3891	2.3416	2.304	2.2735	2.2482	2.2087	2.1671	2.1231	2.1	2.0762	2.0516	2.0261	1.9997	1.9721
12	3.1766	2.8068	2.6055	2.4801	2.394	2.331	2.2828	2.2446	2.2135	2.1878	2.1474	2.1049	2.0597	2.036	2.0115	1.9861	1.9597	1.9323	1.9036
13	3.1362	2.7632	2.5603	2.4337	2.3467	2.283	2.2341	2.1954	2.1638	2.1376	2.0966	2.0532	2.007	1.9827	1.9576	1.9315	1.9043	1.8759	1.8462
14	3.1022	2.7265	2.5222	2.3947	2.3069	2.2426	2.1931	2.1539	2.122	2.0954	2.0537	2.0095	1.9625	1.9377	1.9119	1.8852	1.8572	1.828	1.7973
15	3.0732	2.6952	2.4898	2.3614	2.273	2.2081	2.1582	2.1185	2.0862	2.0593	2.0171	1.9722	1.9243	1.899	1.8728	1.8454	1.8168	1.7867	1.7551
16	3.0481	2.6682	2.4618	2.3327	2.2438	2.1783	2.128	2.088	2.0553	2.0282	1.9854	1.9399	1.8913	1.8656	1.8388	1.8108	1.7816	1.7508	1.7182
17	3.0262	2.6446	2.4374	2.3078	2.2183	2.1524	2.1017	2.0613	2.0284	2.0009	1.9577	1.9117	1.8624	1.8362	1.809	1.7805	1.7506	1.7191	1.6856
18	3.007	2.624	2.416	2.2858	2.1958	2.1296	2.0785	2.0379	2.0047	1.977	1.9333	1.8868	1.8369	1.8104	1.7827	1.7537	1.7232	1.691	1.6567
19	2.9899	2.6056	2.397	2.2663	2.176	2.1094	2.058	2.0171	1.9836	1.9557	1.9117	1.8647	1.8142	1.7873	1.7592	1.7298	1.6988	1.6659	1.6308
20	2.9747	2.5893	2.3801	2.2489	2.1582	2.0913	2.0397	1.9985	1.9649	1.9367	1.8924	1.8449	1.7938	1.7667	1.7382	1.7083	1.6768	1.6433	1.6074
21	2.961	2.5746	2.3649	2.2333	2.1423	2.0751	2.0233	1.9819	1.948	1.9197	1.875	1.8272	1.7756	1.7481	1.7193	1.689	1.6569	1.6228	1.5862
22	2.9486	2.5613	2.3512	2.2193	2.1279	2.0605	2.0084	1.9668	1.9327	1.9043	1.8593	1.8111	1.759	1.7312	1.7021	1.6714	1.6389	1.6042	1.5668
23	2.9374	2.5493	2.3387	2.2065	2.1149	2.0472	1.9949	1.9531	1.9189	1.8903	1.845	1.7964	1.7439	1.7159	1.6864	1.6554	1.6224	1.5871	1.549
24	2.9271	2.5383	2.3274	2.1949	2.103	2.0351	1.9826	1.9407	1.9063	1.8775	1.8319	1.7831	1.7302	1.7019	1.6721	1.6407	1.6073	1.5715	1.5327
25	2.9177	2.5283	2.317	2.1842	2.0922	2.0241	1.9714	1.9293	1.8947	1.8658	1.82	1.7708	1.7175	1.689	1.659	1.6272	1.5934	1.557	1.5176
26	2.9091	2.5191	2.3075	2.1745	2.0822	2.0139	1.961	1.9188	1.8841	1.855	1.809	1.7596	1.7059	1.6771	1.6468	1.6147	1.5805	1.5437	1.5036
27	2.9012	2.5106	2.2987	2.1655	2.073	2.0045	1.9515	1.9091	1.8743	1.8451	1.7989	1.7492	1.6951	1.6662	1.6356	1.6032	1.5686	1.5313	1.4906
28	2.8939	2.5028	2.2906	2.1571	2.0645	1.9959	1.9427	1.9001	1.8652	1.8359	1.7895	1.7395	1.6852	1.656	1.6252	1.5925	1.5575	1.5198	1.4784
29	2.887	2.4955	2.2831	2.1494	2.0566	1.9878	1.9345	1.8918	1.8568	1.8274	1.7808	1.7306	1.6759	1.6466	1.6155	1.5825	1.5472	1.509	1.467
30	2.8807	2.4887	2.2761	2.1422	2.0493	1.9803	1.9269	1.8841	1.849	1.8195	1.7727	1.7223	1.6673	1.6377	1.6065	1.5732	1.5376	1.4989	1.4564
40	2.8354	2.4404	2.2261	2.091	1.9968	1.9269	1.8725	1.8289	1.7929	1.7627	1.7146	1.6624	1.6052	1.5741	1.5411	1.5056	1.4672	1.4248	1.3769
60	2.7911	2.3933	2.1774	2.041	1.9457	1.8747	1.8194	1.7748	1.738	1.707	1.6574	1.6034	1.5435	1.5107	1.4755	1.4373	1.3952	1.3476	1.2915
120	2.7478	2.3473	2.13	1.9923	1.8959	1.8238	1.7675	1.722	1.6843	1.6524	1.6012	1.545	1.4821	1.4472	1.4094	1.3676	1.3203	1.2646	1.1926
Inf	2.7055	2.3026	2.0838	1.9449	1.8473	1.7741	1.7167	1.6702	1.6315	1.5987	1.5458	1.4871	1.4206	1.3832	1.3419	1.2951	1.24	1.1686	1

T - table

t Table

cum. prob	$t_{.50}$	$t_{.75}$	$t_{.80}$	$t_{.85}$	$t_{.90}$	$t_{.95}$	$t_{.975}$	$t_{.99}$	$t_{.995}$	$t_{.999}$	$t_{.9995}$
one-tail	0.50	0.25	0.20	0.15	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
two-tails	1.00	0.50	0.40	0.30	0.20	0.10	0.05	0.02	0.01	0.002	0.001
df											
1	0.000	1.000	1.376	1.963	3.078	6.314	12.71	31.82	63.66	318.31	636.62
2	0.000	0.816	1.061	1.386	1.886	2.920	4.303	6.965	9.925	22.327	31.599
3	0.000	0.765	0.978	1.250	1.638	2.353	3.182	4.541	5.841	10.215	12.924
4	0.000	0.741	0.941	1.190	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	0.000	0.727	0.920	1.156	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	0.000	0.718	0.906	1.134	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	0.000	0.711	0.896	1.119	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	0.000	0.706	0.889	1.108	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	0.000	0.703	0.883	1.100	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	0.000	0.700	0.879	1.093	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	0.000	0.697	0.876	1.088	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	0.000	0.695	0.873	1.083	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	0.000	0.694	0.870	1.079	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	0.000	0.692	0.868	1.076	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	0.000	0.691	0.866	1.074	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	0.000	0.690	0.865	1.071	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	0.000	0.689	0.863	1.069	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	0.000	0.688	0.862	1.067	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	0.000	0.688	0.861	1.066	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	0.000	0.687	0.860	1.064	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	0.000	0.686	0.859	1.063	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	0.000	0.686	0.858	1.061	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	0.000	0.685	0.858	1.060	1.319	1.714	2.069	2.500	2.807	3.485	3.768
24	0.000	0.685	0.857	1.059	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	0.000	0.684	0.856	1.058	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	0.000	0.684	0.856	1.058	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	0.000	0.684	0.855	1.057	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	0.000	0.683	0.855	1.056	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	0.000	0.683	0.854	1.055	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	0.000	0.683	0.854	1.055	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	0.000	0.681	0.851	1.050	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	0.000	0.679	0.848	1.045	1.296	1.671	2.000	2.390	2.660	3.232	3.460
80	0.000	0.678	0.846	1.043	1.292	1.664	1.990	2.374	2.639	3.195	3.416
100	0.000	0.677	0.845	1.042	1.290	1.660	1.984	2.364	2.626	3.174	3.390
1000	0.000	0.675	0.842	1.037	1.282	1.646	1.962	2.330	2.581	3.098	3.300
z	0.000	0.674	0.842	1.036	1.282	1.645	1.960	2.326	2.576	3.090	3.291
	0%	50%	60%	70%	80%	90%	95%	98%	99%	99.8%	99.9%
	Confidence Level										

Z table:

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.9	.00005	.00005	.00004	.00004	.00004	.00004	.00004	.00004	.00003	.00003
-3.8	.00007	.00007	.00007	.00006	.00006	.00006	.00006	.00005	.00005	.00005
-3.7	.00011	.00010	.00010	.00010	.00009	.00009	.00008	.00008	.00008	.00008
-3.6	.00016	.00015	.00015	.00014	.00014	.00013	.00013	.00012	.00012	.00011
-3.5	.00023	.00022	.00022	.00021	.00020	.00019	.00019	.00018	.00017	.00017
-3.4	.00034	.00032	.00031	.00030	.00029	.00028	.00027	.00026	.00025	.00024
-3.3	.00048	.00047	.00045	.00043	.00042	.00040	.00039	.00038	.00036	.00035
-3.2	.00069	.00066	.00064	.00062	.00060	.00058	.00056	.00054	.00052	.00050
-3.1	.00097	.00094	.00090	.00087	.00084	.00082	.00079	.00076	.00074	.00071
-3.0	.00135	.00131	.00126	.00122	.00118	.00114	.00111	.00107	.00104	.00100
-2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
-2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
-2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
-2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
-2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
-2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
-2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
-2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
-2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
-2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
-1.9	.02872	.02807	.02743	.02680	.02619	.02559	.02500	.02442	.02385	.02330
-1.8	.03593	.03515	.03438	.03362	.03288	.03216	.03144	.03074	.03005	.02938
-1.7	.04457	.04363	.04272	.04182	.04093	.04006	.03920	.03836	.03754	.03673
-1.6	.05480	.05370	.05262	.05155	.05050	.04947	.04846	.04746	.04648	.04551
-1.5	.06681	.06552	.06426	.06301	.06178	.06057	.05938	.05821	.05705	.05592
-1.4	.08076	.07927	.07780	.07636	.07493	.07353	.07215	.07078	.06944	.06811
-1.3	.09680	.09510	.09342	.09176	.09012	.08851	.08691	.08534	.08379	.08226
-1.2	.11507	.11314	.11123	.10935	.10749	.10565	.10383	.10204	.10027	.09853
-1.1	.13567	.13350	.13136	.12924	.12714	.12507	.12302	.12100	.11900	.11702
-1.0	.15866	.15625	.15386	.15151	.14917	.14686	.14457	.14231	.14007	.13786
-0.9	.18406	.18141	.17879	.17619	.17361	.17106	.16853	.16602	.16354	.16109
-0.8	.21186	.20897	.20611	.20327	.20045	.19766	.19489	.19215	.18943	.18673
-0.7	.24196	.23885	.23576	.23270	.22965	.22663	.22363	.22065	.21770	.21476
-0.6	.27425	.27093	.26763	.26435	.26109	.25785	.25463	.25143	.24825	.24510
-0.5	.30854	.30503	.30153	.29806	.29460	.29116	.28774	.28434	.28096	.27760
-0.4	.34458	.34090	.33724	.33360	.32997	.32636	.32276	.31918	.31561	.31207
-0.3	.38209	.37828	.37448	.37070	.36693	.36317	.35942	.35569	.35197	.34827
-0.2	.42074	.41683	.41294	.40905	.40517	.40129	.39743	.39358	.38974	.38591
-0.1	.46017	.45620	.45224	.44828	.44433	.44038	.43644	.43251	.42858	.42465
-0.0	.50000	.49601	.49202	.48803	.48405	.48006	.47608	.47210	.46812	.46414

STANDARD NORMAL DISTRIBUTION: Table Values Represent AREA to the LEFT of the Z score.

Z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.50000	.50399	.50798	.51197	.51595	.51994	.52392	.52790	.53188	.53586
0.1	.53983	.54380	.54776	.55172	.55567	.55962	.56356	.56749	.57142	.57535
0.2	.57926	.58317	.58706	.59095	.59483	.59871	.60257	.60642	.61026	.61409
0.3	.61791	.62172	.62552	.62930	.63307	.63683	.64058	.64431	.64803	.65173
0.4	.65542	.65910	.66276	.66640	.67003	.67364	.67724	.68082	.68439	.68793
0.5	.69146	.69497	.69847	.70194	.70540	.70884	.71226	.71566	.71904	.72240
0.6	.72575	.72907	.73237	.73565	.73891	.74215	.74537	.74857	.75175	.75490
0.7	.75804	.76115	.76424	.76730	.77035	.77337	.77637	.77935	.78230	.78524
0.8	.78814	.79103	.79389	.79673	.79955	.80234	.80511	.80785	.81057	.81327
0.9	.81594	.81859	.82121	.82381	.82639	.82894	.83147	.83398	.83646	.83891
1.0	.84134	.84375	.84614	.84849	.85083	.85314	.85543	.85769	.85993	.86214
1.1	.86433	.86650	.86864	.87076	.87286	.87493	.87698	.87900	.88100	.88298
1.2	.88493	.88686	.88877	.89065	.89251	.89435	.89617	.89796	.89973	.90147
1.3	.90320	.90490	.90658	.90824	.90988	.91149	.91309	.91466	.91621	.91774
1.4	.91924	.92073	.92220	.92364	.92507	.92647	.92785	.92922	.93056	.93189
1.5	.93319	.93448	.93574	.93699	.93822	.93943	.94062	.94179	.94295	.94408
1.6	.94520	.94630	.94738	.94845	.94950	.95053	.95154	.95254	.95352	.95449
1.7	.95543	.95637	.95728	.95818	.95907	.95994	.96080	.96164	.96246	.96327
1.8	.96407	.96485	.96562	.96638	.96712	.96784	.96856	.96926	.96995	.97062
1.9	.97128	.97193	.97257	.97320	.97381	.97441	.97500	.97558	.97615	.97670
2.0	.97725	.97778	.97831	.97882	.97932	.97982	.98030	.98077	.98124	.98169
2.1	.98214	.98257	.98300	.98341	.98382	.98422	.98461	.98500	.98537	.98574
2.2	.98610	.98645	.98679	.98713	.98745	.98778	.98809	.98840	.98870	.98899
2.3	.98928	.98956	.98983	.99010	.99036	.99061	.99086	.99111	.99134	.99158
2.4	.99180	.99202	.99224	.99245	.99266	.99286	.99305	.99324	.99343	.99361
2.5	.99379	.99396	.99413	.99430	.99446	.99461	.99477	.99492	.99506	.99520
2.6	.99534	.99547	.99560	.99573	.99585	.99598	.99609	.99621	.99632	.99643
2.7	.99653	.99664	.99674	.99683	.99693	.99702	.99711	.99720	.99728	.99736
2.8	.99744	.99752	.99760	.99767	.99774	.99781	.99788	.99795	.99801	.99807
2.9	.99813	.99819	.99825	.99831	.99836	.99841	.99846	.99851	.99856	.99861
3.0	.99865	.99869	.99874	.99878	.99882	.99886	.99889	.99893	.99896	.99900
3.1	.99903	.99906	.99910	.99913	.99916	.99918	.99921	.99924	.99926	.99929
3.2	.99931	.99934	.99936	.99938	.99940	.99942	.99944	.99946	.99948	.99950
3.3	.99952	.99953	.99955	.99957	.99958	.99960	.99961	.99962	.99964	.99965
3.4	.99966	.99968	.99969	.99970	.99971	.99972	.99973	.99974	.99975	.99976
3.5	.99977	.99978	.99978	.99979	.99980	.99981	.99981	.99982	.99983	.99983
3.6	.99984	.99985	.99985	.99986	.99986	.99987	.99987	.99988	.99988	.99989
3.7	.99989	.99990	.99990	.99990	.99991	.99991	.99992	.99992	.99992	.99992
3.8	.99993	.99993	.99993	.99994	.99994	.99994	.99994	.99995	.99995	.99995
3.9	.99995	.99995	.99996	.99996	.99996	.99996	.99996	.99996	.99997	.99997

Chi Square:

df	$\chi^2_{.995}$	$\chi^2_{.990}$	$\chi^2_{.975}$	$\chi^2_{.950}$	$\chi^2_{.900}$	$\chi^2_{.100}$	$\chi^2_{.050}$	$\chi^2_{.025}$	$\chi^2_{.010}$	$\chi^2_{.005}$
1	0.000	0.000	0.001	0.004	0.016	2.706	3.841	5.024	6.635	7.879
2	0.010	0.020	0.051	0.103	0.211	4.605	5.991	7.378	9.210	10.597
3	0.072	0.115	0.216	0.352	0.584	6.251	7.815	9.348	11.345	12.838
4	0.207	0.297	0.484	0.711	1.064	7.779	9.488	11.143	13.277	14.860
5	0.412	0.554	0.831	1.145	1.610	9.236	11.070	12.833	15.086	16.750
6	0.676	0.872	1.237	1.635	2.204	10.645	12.592	14.449	16.812	18.548
7	0.989	1.239	1.690	2.167	2.833	12.017	14.067	16.013	18.475	20.278
8	1.344	1.646	2.180	2.733	3.490	13.362	15.507	17.535	20.090	21.955
9	1.735	2.088	2.700	3.325	4.168	14.684	16.919	19.023	21.666	23.589
10	2.156	2.558	3.247	3.940	4.865	15.987	18.307	20.483	23.209	25.188
11	2.603	3.053	3.816	4.575	5.578	17.275	19.675	21.920	24.725	26.757
12	3.074	3.571	4.404	5.226	6.304	18.549	21.026	23.337	26.217	28.300
13	3.565	4.107	5.009	5.892	7.042	19.812	22.362	24.736	27.688	29.819
14	4.075	4.660	5.629	6.571	7.790	21.064	23.685	26.119	29.141	31.319
15	4.601	5.229	6.262	7.261	8.547	22.307	24.996	27.488	30.578	32.801
16	5.142	5.812	6.908	7.962	9.312	23.542	26.296	28.845	32.000	34.267
17	5.697	6.408	7.564	8.672	10.085	24.769	27.587	30.191	33.409	35.718
18	6.265	7.015	8.231	9.390	10.865	25.989	28.869	31.526	34.805	37.156
19	6.844	7.633	8.907	10.117	11.651	27.204	30.144	32.852	36.191	38.582
20	7.434	8.260	9.591	10.851	12.443	28.412	31.410	34.170	37.566	39.997
21	8.034	8.897	10.283	11.591	13.240	29.615	32.671	35.479	38.932	41.401
22	8.643	9.542	10.982	12.338	14.041	30.813	33.924	36.781	40.289	42.796
23	9.260	10.196	11.689	13.091	14.848	32.007	35.172	38.076	41.638	44.181
24	9.886	10.856	12.401	13.848	15.659	33.196	36.415	39.364	42.980	45.559
25	10.520	11.524	13.120	14.611	16.473	34.382	37.652	40.646	44.314	46.928
26	11.160	12.198	13.844	15.379	17.292	35.563	38.885	41.923	45.642	48.290
27	11.808	12.879	14.573	16.151	18.114	36.741	40.113	43.195	46.963	49.645
28	12.461	13.565	15.308	16.928	18.939	37.916	41.337	44.461	48.278	50.993
29	13.121	14.256	16.047	17.708	19.768	39.087	42.557	45.722	49.588	52.336
30	13.787	14.953	16.791	18.493	20.599	40.256	43.773	46.979	50.892	53.672
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

df	0.99	0.95	0.90	0.75	0.50	0.25	0.10	0.05	0.01
1	0.000	0.004	0.016	0.102	0.455	1.320	2.710	3.840	6.630
2	0.020	0.103	0.211	0.575	1.386	2.770	4.610	5.990	9.210
3	0.115	0.352	0.584	1.212	2.366	4.110	6.250	7.810	11.34
4	0.297	0.711	1.064	1.923	3.357	5.390	7.780	9.490	13.28
5	0.554	1.145	1.610	2.675	4.351	6.630	9.240	11.07	15.09
6	0.872	1.635	2.204	3.455	5.348	7.840	10.64	12.59	16.81
7	1.239	2.167	2.833	4.255	6.346	9.040	12.02	14.07	18.48
8	1.646	2.733	3.490	5.071	7.344	10.22	13.36	15.51	20.09
9	2.088	3.325	4.168	5.899	8.343	11.39	14.68	16.92	21.67
10	2.558	3.940	4.865	6.737	9.342	12.55	15.99	18.31	23.21
11	3.053	4.575	5.578	7.584	10.341	13.70	17.28	19.68	24.72
12	3.571	5.226	6.304	8.438	11.340	14.85	18.55	21.03	26.22
13	4.107	5.892	7.042	9.299	12.340	15.98	19.81	22.36	27.69
14	4.660	6.571	7.790	10.165	13.339	17.12	21.06	23.68	29.14
15	5.229	7.261	8.547	11.037	14.339	18.25	22.31	25.00	30.58
16	5.812	7.962	9.312	11.912	15.338	19.37	23.54	26.30	32.00
17	6.408	8.672	10.085	12.792	16.338	20.49	24.77	27.59	33.41
18	7.015	9.390	10.865	13.675	17.338	21.60	25.99	28.87	34.80
19	7.633	10.117	11.651	14.562	18.338	22.72	27.20	30.14	36.19
20	8.260	10.851	12.443	15.452	19.337	23.83	28.41	31.41	37.57
22	9.542	12.338	14.041	17.240	21.337	26.04	30.81	33.92	40.29
24	10.856	13.848	15.659	19.037	23.337	28.24	33.20	36.42	42.98
26	12.198	15.379	17.292	20.843	25.336	30.43	35.56	38.89	45.64
28	13.565	16.928	18.939	22.657	27.336	32.62	37.92	41.34	48.28
30	14.954	18.493	20.599	24.478	29.336	34.80	40.26	43.77	50.89
40	22.164	26.509	29.051	33.660	39.335	45.62	51.80	55.76	63.69
50	27.707	34.764	37.689	42.942	49.335	56.33	63.17	67.50	76.15
60	37.485	43.188	46.459	52.294	59.335	66.98	74.40	79.08	88.38

Important to consider:

1.) When to use one tail or two tails?

Use one tail when the hypothesis is greater or less than some value. Two tail if is or not the same of a given value (=/)

2.) If no sample is mentioned then its a population

3.) If no replacement than => Hypergeometric dis, if yes the binomial dis

4.) use the z table if the sample is larger than 30, and the t table if less.

5.) use continuity correction IF the hypo is about quantity (discrete). So continuous values such as test scores DOES not require continuity correction.

6.) Steps of solving Anova! (One way)

1.) State the null hyp and all hypo. At least 1 diff in means bla bla.

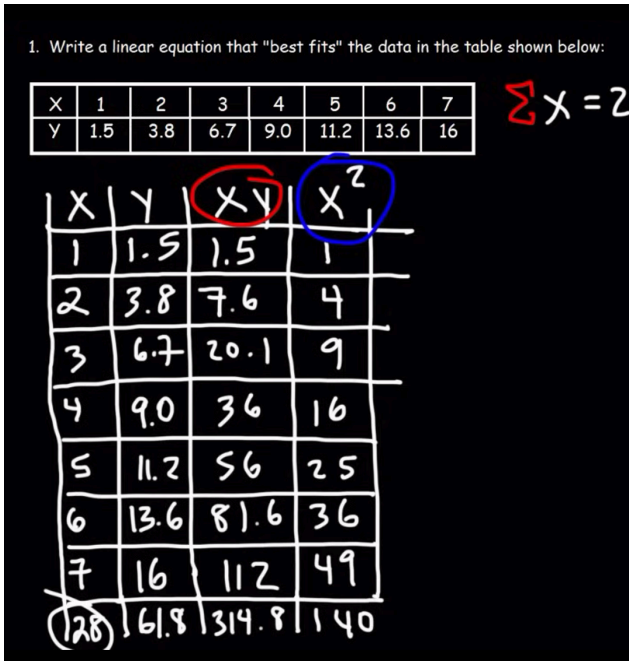
2.) Find the degree of freedom (Between, within, and total (Between + within))

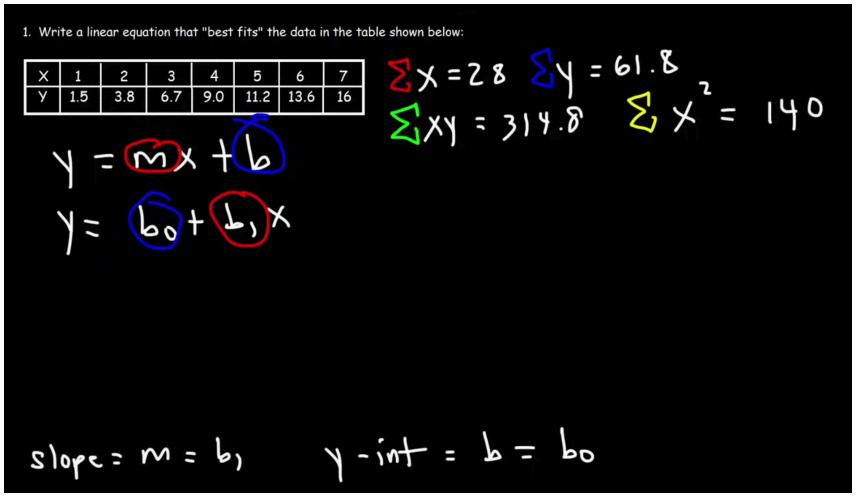
3.) Sum of squares (within, between (total - within) and total) But find grand mean first

4.) Find the variance between and within

5.) Find FFF Statistic

Regression (Least Squares method)





1. Write a linear equation that "best fits" the data in the table shown below:

X	1	2	3	4	5	6	7
Y	1.5	3.8	6.7	9.0	11.2	13.6	16

$\Sigma x = 28 \quad \Sigma y = 61.8 \quad n = 7$

$\Sigma xy = 314.8 \quad \Sigma x^2 = 140$

$y = mx + b$

$$m = \frac{n\Sigma xy - \Sigma x \Sigma y}{n\Sigma x^2 - (\Sigma x)^2} = \frac{7(314.8) - (28)(61.8)}{7(140) - (28)^2}$$

$$m = \frac{473.2}{196} = 2.4142857$$

$m = 2.4142857$

1. Write a linear equation that "best fits" the data in the table shown below:

X	1	2	3	4	5	6	7
Y	1.5	3.8	6.7	9.0	11.2	13.6	16

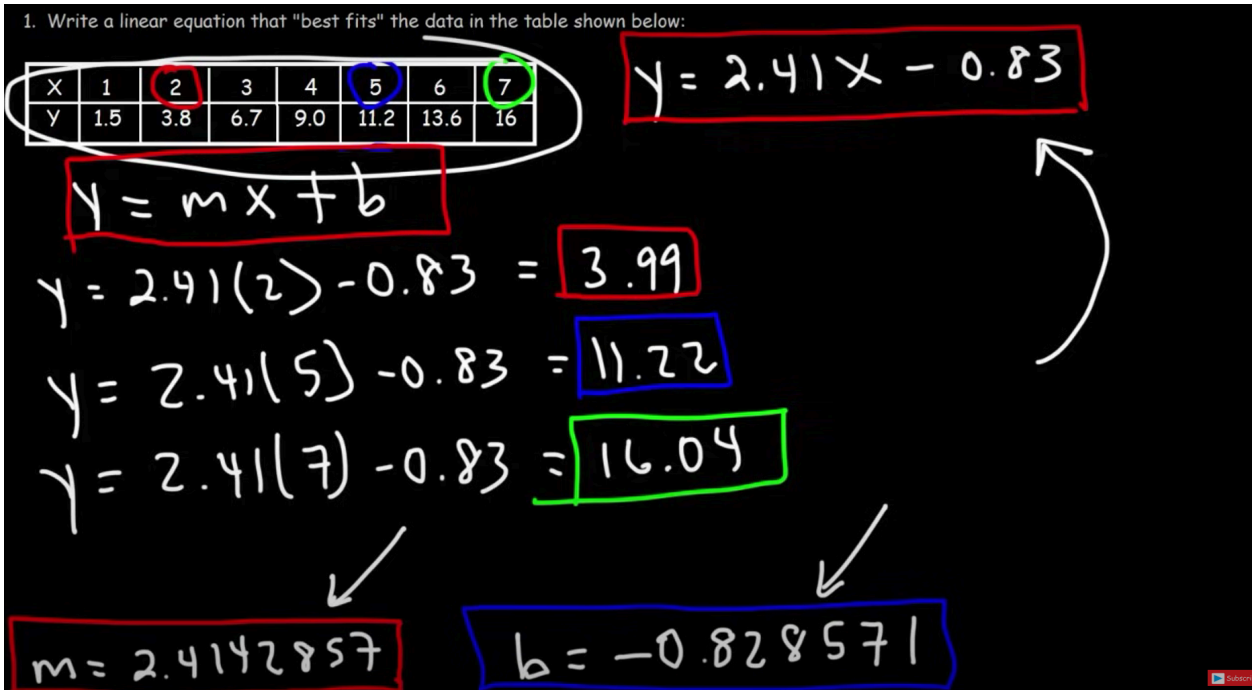
$\Sigma x = 28 \quad \Sigma y = 61.8 \quad n = 7$

$\Sigma xy = 314.8 \quad \Sigma x^2 = 140$

$y = mx + b$

$$b = \frac{\Sigma y - m\Sigma x}{n} = \frac{61.8 - (2.4142857)(28)}{7}$$

$m = 2.4142857$ $\quad b = -0.8285714$



Chi square:
1.) State the hypothesis

State the Hypotheses

Null Hypothesis (H_0):

Plant type and fertilizer preference are independent.

Alternative Hypothesis (H_1):

Plant type and fertilizer preference are not independent (there is an association)

2.) Calculate the Expected Frequencies (If already exist dont)

The formula for the expected frequency for a cell is:

$$E_{ij} = \frac{\text{Row Total} \times \text{Column Total}}{\text{Grand Total}}$$

For each cell:

3.) Find the Chi Square Statistics

The formula for the Chi-Square statistic is:

$$\chi^2 = \sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Calculate for each cell:

Fertilizer X, Plant Type A:

$$\frac{(10-13.33)^2}{13.33} = \frac{(-3.33)^2}{13.33} = \frac{11.09}{13.33} = 0.83$$

Fertilizer X, Plant Type B:

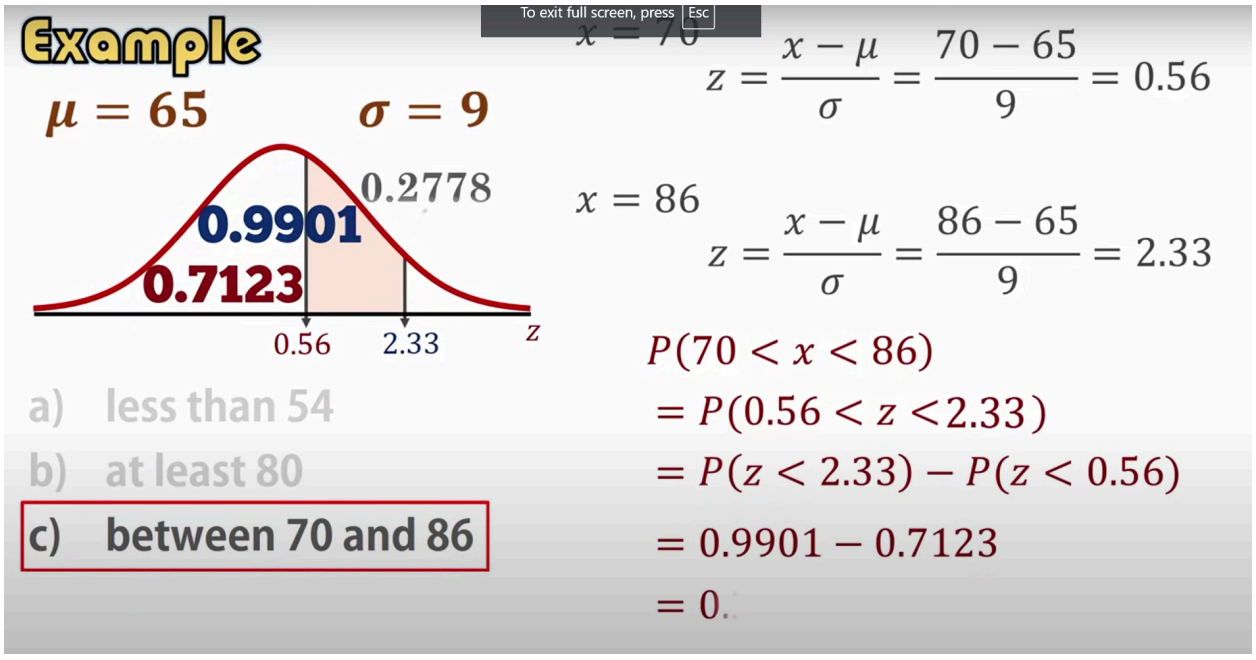
$$\frac{(20-15.56)^2}{15.56} = \frac{(4.44)^2}{15.56} = \frac{19.71}{15.56} = 1.27$$

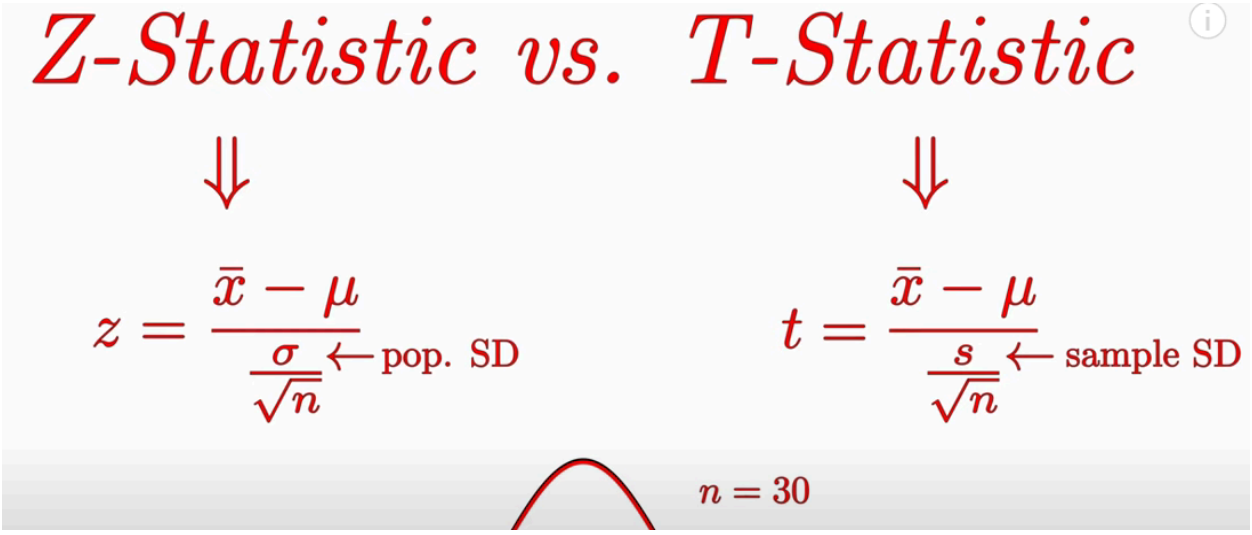
Fertilizer X, Plant Type C:

$$\frac{(10-13.33)^2}{13.33} = \frac{(-3.33)^2}{13.33} = \frac{11.09}{13.33} = 0.11$$

Repeat for all cells. Summing these values gives:

$\chi^2 = 0.83 + 1.27 + 0.11 + 2.50 + 0.24 + 1.33 + 0.42 + 0.99 + 3.55 = 11.24$





Anova:
To find the **sum of squares between groups** (SSB) and **sum of squares within groups** (SSW), you typically need data organized into groups. Here's a simple example to illustrate how they are calculated:

Example:

Imagine you have test scores from 3 groups of students.

- **Group 1**: 5, 7, 8
- **Group 2**: 10, 12, 15
- **Group 3**: 6, 8, 9

Total scores: 5, 7, 8, 10, 12, 15, 6, 8, 9

Step 1: Calculate the Grand Mean (the mean of all data points).

$$\text{Grand Mean} = \frac{(5+7+8+10+12+15+6+8+9)}{9} = \frac{80}{9} \approx 8.89$$

Step 2: Calculate the Sum of Squares Total (SST).

This is the sum of the squared differences between each data point and the grand mean:

$$SST = \sum(X_i - \text{Grand Mean})^2$$

Using each individual value, this sum can be computed as:

$$SST = (5 - 8.89)^2 + (7 - 8.89)^2 + (8 - 8.89)^2 + (10 - 8.89)^2 +$$

Step 3: Calculate the Sum of Squares Between Groups (SSB).

This represents the variation between the group means and the grand mean. First, calculate the mean of each group:

- Group 1 mean: $\frac{5+7+8}{3} = 6.67$
- Group 2 mean: $\frac{10+12+15}{3} = 12.33$
- Group 3 mean: $\frac{6+8+9}{3} = 7.67$

Now, compute the sum of squares between groups:

$$SSB = n_1(\text{Mean}_1 - \text{Grand Mean})^2 + n_2(\text{Mean}_2 - \text{Grand Mean})^2 + n_3(\text{Mean}_3 - \text{Grand Mean})^2$$

Where n_1, n_2, n_3 are the number of observations in each group. In this case, all groups have 3 observations:

$$SSB = 3(6.67 - 8.89)^2 + 3(12.33 - 8.89)^2 + 3(7.67 - 8.89)^2$$

Step 4: Calculate the Sum of Squares Within Groups (SSW).

This represents the variation within each group. For each group, compute the sum of squared differences between each observation and its group mean:

This represents the variation within each group. For each group, compute the sum of squared differences between each observation and its group mean:

$$SSW = \sum_i (X_i - \text{Group Mean})^2$$

For example, for Group 1:

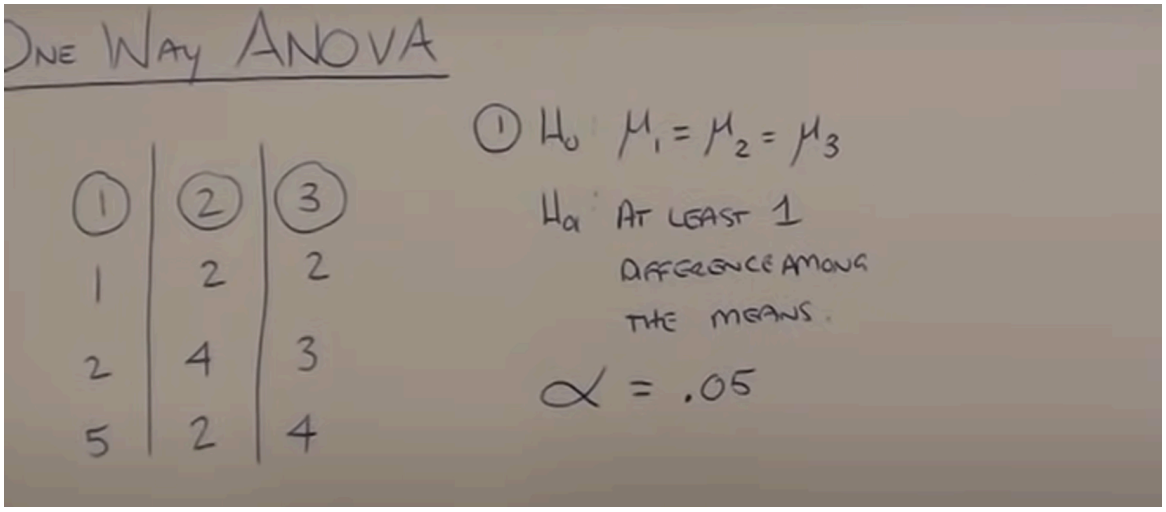
$$SSW_1 = (5 - 6.67)^2 + (7 - 6.67)^2 + (8 - 6.67)^2$$

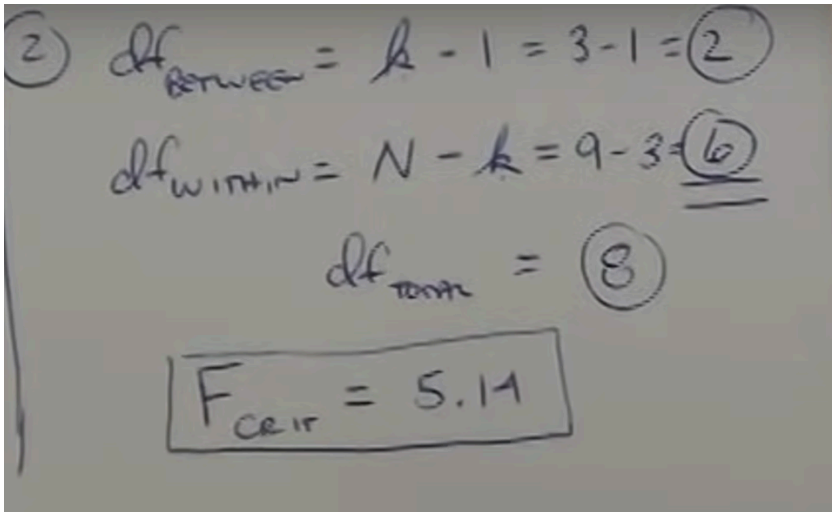
Repeat for all groups, then sum the values to get SSW.

Once you have **SST**, **SSB**, and **SSW**, you can use them in **ANOVA** (Analysis of Variance) to test for statistical differences between the groups.

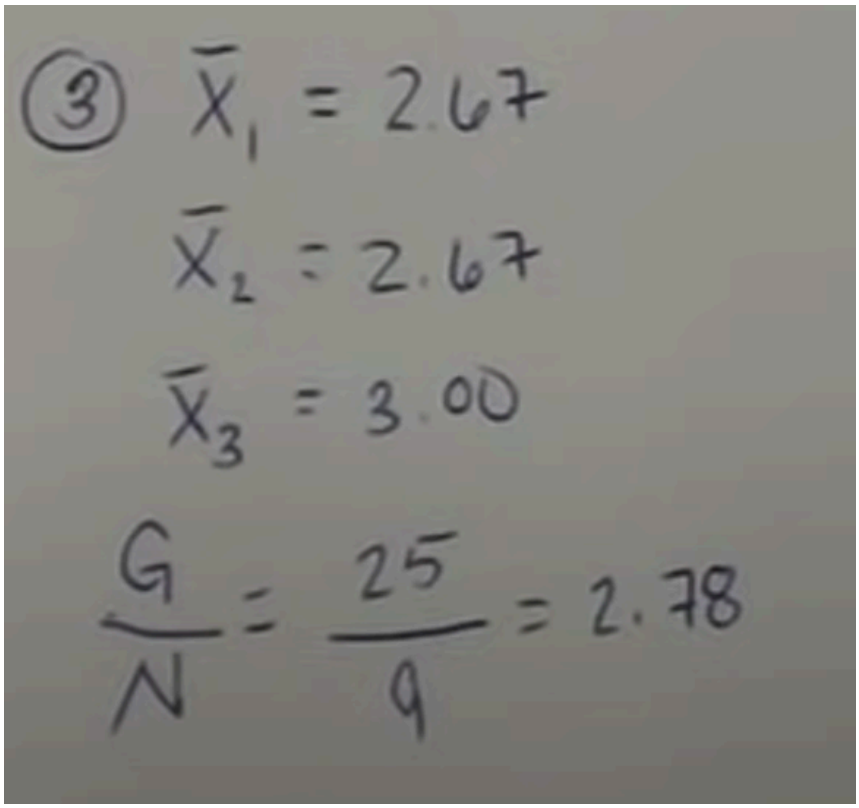
Let me know if you'd like further explanation or calculations for this example!

More details for one way anova walkthrough:

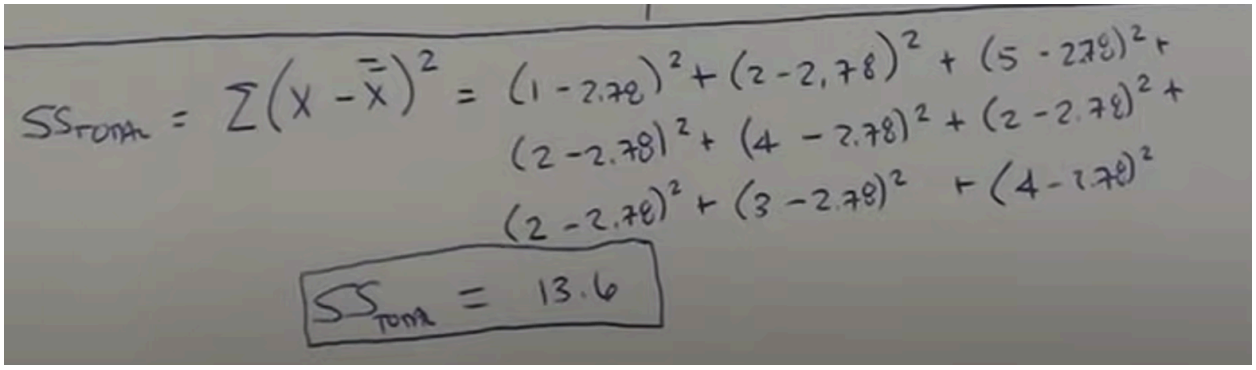


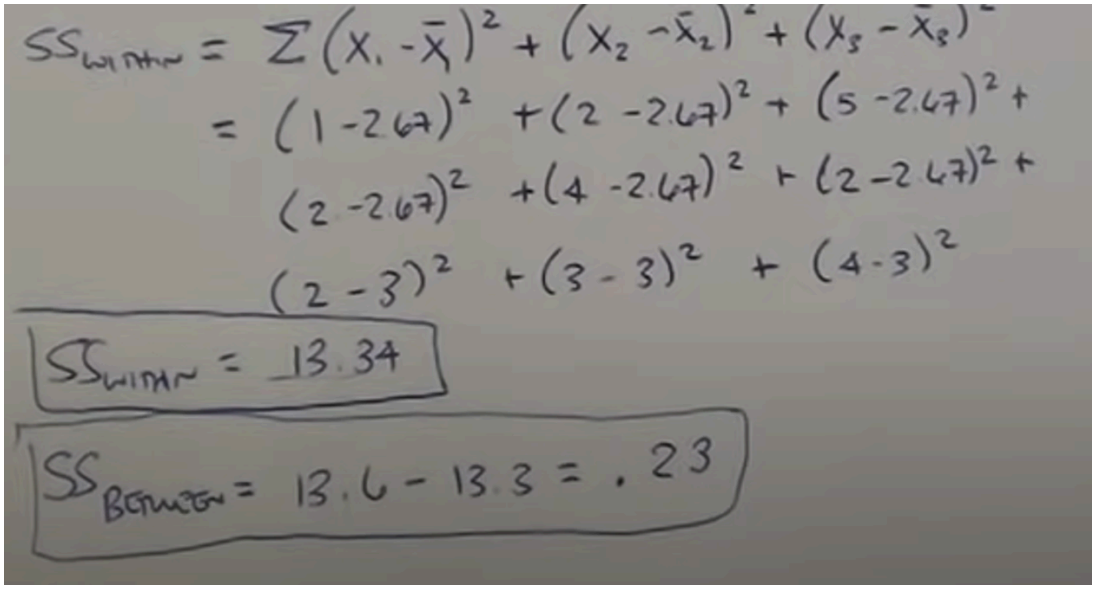


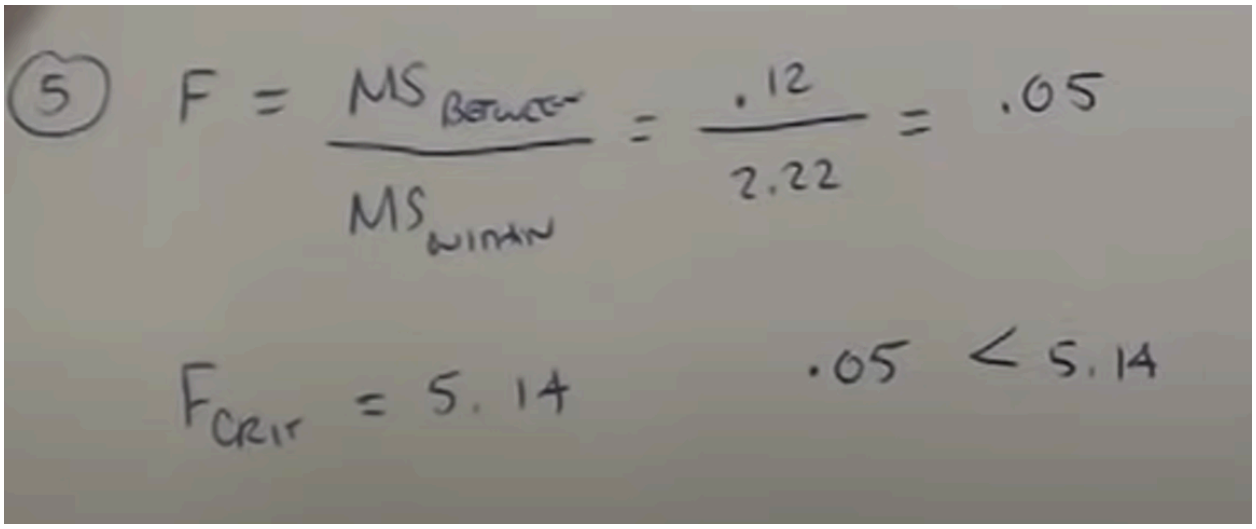
K -> number of categories. Find the f through the f dis table

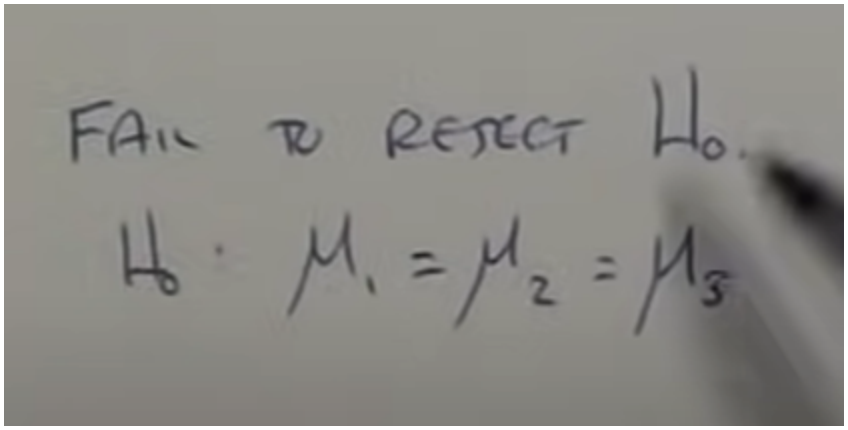


The x1,2,3 are the mean. G is the grand total (Sigma children value) while N is quantity.








FAIL TO REJECT H_0.
H_0: $\mu_1 = \mu_2 = \mu_3$

TWO way Anova:

Null hypothesis H0:

There is no significant difference between the groups of the first factor.

There is no significant difference between the groups of the second factor.

One factor has no effect on the effect of the other factor.

Alternative hypothesis H1:

There is a significant difference between the groups of the first factor.

There is a significant difference between the groups of the second factor.

One factor has an influence on the effect of the other factor.

Drug	Gender	Reduc. BP
A	male	6
A	male	4
A	male	5
A	female	3
A	female	4
A	female	3
B	male	5
B	male	9
B	male	2
...	...	...

	Drug A	Drug B	
Male	6	4	
	4	5	
	7	6	
	9	7	
	3	5	
Mean	5.8	5.4	5.6
Female	8	3	
	3	5	
	5	9	
	8	2	
	6	3	
Mean	6	4.4	5.2
	5.9	4.9	5.4

$$SS_{tot} = \sum\sum\sum (x_{mij} - \bar{G})^2$$
$$= (6 - 5.4)^2 + (4 - 5.4)^2 + \cdots + (3 - 5.4)^2$$

$$df_{\text{tot}} = n \cdot p \cdot q - 1$$
$$= 5 \cdot 2 \cdot 2 - 1$$
$$= 19$$

$$\sigma^2_{tot} = \frac{SS_{tot}}{df_{tot}} = \frac{84.8}{19} = 4.46$$

	Drug A	Drug B	
Male	6	4	
	4	5	
	7	6	
	9	7	
	3	5	
Mean	5.8	5.4	5.6
Female	8	3	
	3	5	
	5	9	
	8	2	
	6	3	
Mean	6	4.4	5.2
	5.9	4.9	5.4

Mean value of each group

Total mean

$$SS_{btw} = n \cdot \sum\sum \left(\overline{AB}_{ij} - \bar{G}\right)^2$$

$$= 5 \cdot \left((5.8 - 5.4)^2 + (5.4 - 5.4)^2 + \cdots + (4.4 - 5.4)^2\right)$$

$$= 7.6$$

$$df_{btw} = p \cdot q - 1$$

$$= 2 \cdot 2 - 1$$

$$= 3$$

$$\sigma^2_{btw} = \frac{SS_{btw}}{df_{btw}} = \frac{7.6}{3} = 2.53$$

	Drug A	Drug B	
Male	6	4	
	4	5	
	7	6	
	9	7	
	3	5	
Mean	5.8	5.4	5.6
Female	8	3	
	3	5	
	5	9	
	8	2	
	6	3	
Mean	6	4.4	5.2
	5.9	4.9	5.4

Mean value of the groups of factor A

$$SS_A = n \cdot q \sum (\bar{A}_i - \bar{G})^2$$

$$= 5 \cdot 2\left((5.9 - 5.4)^2 + (4.9 - 5.4)^2\right)$$

$$= 5$$

$$df_A = p - 1$$

$$df_A = 2 - 1$$

$$= 1$$

$$\sigma^2_A = \frac{SS_A}{df_A} = \frac{5}{1} = 5$$

	Drug A	Drug B	
Male	6	4	
	4	5	
	7	6	
	9	7	
	3	5	
Mean	5.8	5.4	5.6
Female	8	3	
	3	5	
	5	9	
	8	2	
	6	3	
Mean	6	4.4	5.2
	5.9	4.9	5.4

Mean value of the groups of factor B

$$SS_B = n \cdot p \sum (\bar{B}_i - \bar{G})^2$$
$$= 5 \cdot 2 \left((5.6 - 5.4)^2 + (5.2 - 5.4)^2\right)$$
$$= 0{,}8$$

$$df_B = q - 1$$
$$df_B = 2 - 1$$
$$= 1$$

$$\sigma_B^2 = \frac{SS_B}{df_B} = \frac{0.8}{1} = 0.8$$

	Drug A	Drug B	
Male	6	4	
	4	5	
	7	6	
	9	7	
	3	5	
Mean	5.8	5.4	5.6
Female	8	3	
	3	5	
	5	9	
	8	2	
	6	3	
Mean	6	4.4	5.2
	5.9	4.9	5.4

$$SS_{AB} = SS_{btw} - SS_A - SS_B$$
$$= 7.6 - 5 - 0.8$$
$$= 1.8$$

$$df_{AB} = (p - 1) \cdot (q - 1)$$
$$df_{AB} = 1 \cdot 1$$
$$= 1$$

$$\sigma_{AB}^2 = \frac{SS_{AB}}{df_{AB}} = \frac{1.8}{1} = 1.8$$

	Drug A	Drug B	
Male	6	4	
	4	5	
	7	6	
	9	7	
	3	5	
Mean	5.8	5.4	5.6
Female	8	3	
	3	5	
	5	9	
	8	2	
	6	3	
Mean	6	4.4	5.2
	5.9	4.9	5.4

Individual values

Mean value of the groups

$$SS_{err} = \sum\sum\sum (x_{mij} - \overline{AB}_{ij})^2$$

$$= (6 - 5.8)^2 + (4 - 5.4)^2 + \cdots + (3 - 4.4)^2$$

$$= 77{,}2$$

$$df_{\text{err}} = (n - 1) \cdot p \cdot q$$

$$= 4 \cdot 2 \cdot 2$$

$$= 16$$

$$\sigma^2_{err} = \frac{SS_{err}}{df_{err}} = \frac{77.2}{16} = 4.83$$

	Drug A	Drug B	
Male	6	4	
	4	5	
	7	6	
	9	7	
	3	5	
Mean	5.8	5.4	5.6
Female	8	3	
	3	5	
	5	9	
	8	2	
	6	3	
Mean	6	4.4	5.2
	5.9	4.9	5.4

\

$$F_A = \frac{\sigma^2_A}{\sigma^2_{err}} = \frac{5}{4.83} = 1.04$$

$$F_B = \frac{\sigma^2_B}{\sigma^2_{err}} = \frac{0.8}{4.83} = 0.17$$

$$F_{AB} = \frac{\sigma^2_{AB}}{\sigma^2_{err}} = \frac{1.8}{4.83} = 0.37$$

ANOVA

Copy Settings

	Type III Sum of Squares	df	Mean Squares	F	p	Eta_p^2
Drug	5	1	5	1.04	.324	0.06
Gender	0.8	1	0.8	0.17	.689	0.01
Drug x Gender	1.8	1	1.8	0.37	.55	0.02
Error	77.2	16	4.83			

$$F_A = \frac{\sigma^2_A}{\sigma^2_{err}} = \frac{5}{4.83} = 1.04$$

$$F_B = \frac{\sigma^2_B}{\sigma^2_{err}} = \frac{0.8}{4.83} = 0.17$$

$$F_{AB} = \frac{\sigma^2_{AB}}{\sigma^2_{err}} = \frac{1.8}{4.83} = 0.373$$

$$df_{\text{A}} = 1 \qquad df_{\text{B}} = 1 \qquad df_{\text{AB}} = 1$$

$$df_{\text{err}} = 16 \qquad df_{\text{err}} = 16 \qquad df_{\text{err}} = 16$$

Calculator Website:

P value
https://www.omnicalculator.com/statistics/p-value
https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.graphpad.com/quickcalcs/pvalue1/&ved=2ahUKEwib3IG48vKKAxXCUGwGHYjQKJwQFnoECC8QAQ&usg=AOvVaw0iCONtF9wIQDS4BzUhzRAP
https://www.google.com/url?sa=t&source=web&rct=j&opi=89978449&url=https://www.socscistatistics.com/pvalues/&ved=2ahUKEwib3IG48vKKAxXCUGwGHYjQKJwQFnoECCwQAQ&usg=AOvVaw1cPHHMY8jJZcHXHm-ArtC3

Standard Deviation Calculator:
https://www.calculator.net/standard-deviation-calculator.html

Anova Calculator:
https://www.statskingdom.com/180Anova1way.html
https://www.standarddeviationcalculator.io/anova-calculator
https://datatab.net/statistics-calculator/hypothesis-test/two-way-anova-calculator

Scientific Calculator:
https://www.desmos.com/scientific

Other Link:
https://atozmath.com/CONM/NonParaTest.aspx?q=chi2t&q1=10%2C15%2C5%3B20%2C10%2C5%3B10%2C5%2C10%600.05%601&dp=4&do=1#PrevPart
https://atozmath.com/CONM/Anova.aspx?q=anova2&q1=78%2382%2385%2c90%2388%2392%3b72%2375%2374%2c85%2380%2384%3b65%2368%2370%2c78%2375%2380%60%60&dp=4&do=1#PrevPart
https://atozmath.com/CONM/Anova.aspx?q=anova1
https://github.com/L1M1N4L/StatsFinalNotes