How to Find and Use an F Distribution Table

Authored by

stats writer

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An F Distribution Table is an indispensable resource in the field of statistical analysis, providing researchers and students with the necessary critical values to perform hypothesis testing. Often referred to simply as an F-table or an F-test table, this resource is fundamental for conducting the F-test, which is primarily used to compare variances or assess the overall significance of regression models, such as in Analysis of Variance (ANOVA). The table is systematically designed to facilitate the calculation of the probability of obtaining an observed F-statistic for a specific set of parameters, known as the degrees of freedom. Finding this table is straightforward; it is readily available in virtually all major statistics textbooks and, increasingly, in comprehensive digital formats online, including the detailed compilation provided below.

The structure of the F Distribution Table is logical yet specific, requiring careful interpretation. It is typically divided based on two distinct sets of degrees of freedom (df): the numerator degrees of freedom (nu_1), which are listed across the top margin (columns), and the denominator degrees of freedom (nu_2), which are listed down the left margin (rows). The entries in the table are the corresponding critical value of the F-statistic at a predefined level of significance ($alpha$). These tabulated entries are pivotal because they define the threshold. If the calculated F-statistic from your data exceeds this critical value, it signifies that the result falls into the rejection region, leading to the rejection of the null hypothesis (H_0). Understanding how to navigate this two-dimensional table is the key to successfully interpreting the outcomes of variance comparisons.

F Table for α **= 0.10** (Click to zoom in)

	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

F Table for α **= 0.05** (Click to zoom in)

	DF1	α = 0.05																	
DF2	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	Inf
1	161.45	199.5	215.71	224.58	230.16	233.99	236.77	238.88	240.54	241.88	243.91	245.95	248.01	249.05	250.1	251.14	252.2	253.25	254.31
2	18.513	19	19.164	19.247	19.296	19.33	19.353	19.371	19.385	19.396	19.413	19.429	19.446	19.454	19.462	19.471	19.479	19.487	19.496
3	10.128	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123	8.7855	8.7446	8.7029	8.6602	8.6385	8.6166	8.5944	8.572	8.5494	8.5264
4	7.7086	6.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.041	5.9988	5.9644	5.9117	5.8578	5.8025	5.7744	5.7459	5.717	5.6877	5.6581	5.6281
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725	4.7351	4.6777	4.6188	4.5581	4.5272	4.4957	4.4638	4.4314	4.3985	4.365
6	5.9874	5.1433	4.7571	4.5337	4.3874	4.2839	4.2067	4.1468	4.099	4.06	3.9999	3.9381	3.8742	3.8415	3.8082	3.7743	3.7398	3.7047	3.6689
7	5.5914	4.7374	4.3468	4.1203	3.9715	3.866	3.787	3.7257	3.6767	3.6365	3.5747	3.5107	3.4445	3.4105	3.3758	3.3404	3.3043	3.2674	3.2298
8	5.3177	4.459	4.0662	3.8379	3.6875	3.5806	3.5005	3.4381	3.3881	3.3472	3.2839	3.2184	3.1503	3.1152	3.0794	3.0428	3.0053	2.9669	2.9276
9	5.1174	4.2565	3.8625	3.6331	3.4817	3.3738	3.2927	3.2296	3.1789	3.1373	3.0729	3.0061	2.9365	2.9005	2.8637	2.8259	2.7872	2.7475	2.7067
10	4.9646	4.1028	3.7083	3.478	3.3258	3.2172	3.1355	3.0717	3.0204	2.9782	2.913	2.845	2.774	2.7372	2.6996	2.6609	2.6211	2.5801	2.5379
11	4.8443	3.9823	3.5874	3.3567	3.2039	3.0946	3.0123	2.948	2.8962	2.8536	2.7876	2.7186	2.6464	2.609	2.5705	2.5309	2.4901	2.448	2.4045
12	4.7472	3.8853	3.4903	3.2592	3.1059	2.9961	2.9134	2.8486	2.7964	2.7534	2.6866	2.6169	2.5436	2.5055	2.4663	2.4259	2.3842	2.341	2.2962
13	4.6672	3.8056	3.4105	3.1791	3.0254	2.9153	2.8321	2.7669	2.7144	2.671	2.6037	2.5331	2.4589	2.4202	2.3803	2.3392	2.2966	2.2524	2.2064
14	4.6001	3.7389	3.3439	3.1122	2.9582	2.8477	2.7642	2.6987	2.6458	2.6022	2.5342	2.463	2.3879	2.3487	2.3082	2.2664	2.2229	2.1778	2.1307
15	4.5431	3.6823	3.2874	3.0556	2.9013	2.7905	2.7066	2.6408	2.5876	2.5437	2.4753	2.4034	2.3275	2.2878	2.2468	2.2043	2.1601	2.1141	2.0658
16	4.494	3.6337	3.2389	3.0069	2.8524	2.7413	2.6572	2.5911	2.5377	2.4935	2.4247	2.3522	2.2756	2.2354	2.1938	2.1507	2.1058	2.0589	2.0096
17	4.4513	3.5915	3.1968	2.9647	2.81	2.6987	2.6143	2.548	2.4943	2.4499	2.3807	2.3077	2.2304	2.1898	2.1477	2.104	2.0584	2.0107	1.9604
18	4.4139	3.5546	3.1599	2.9277	2.7729	2.6613	2.5767	2.5102	2.4563	2.4117	2.3421	2.2686	2.1906	2.1497	2.1071	2.0629	2.0166	1.9681	1.9168
19	4.3807	3.5219	3.1274	2.8951	2.7401	2.6283	2.5435	2.4768	2.4227	2.3779	2.308	2.2341	2.1555	2.1141	2.0712	2.0264	1.9795	1.9302	1.878
20	4.3512	3.4928	3.0984	2.8661	2.7109	2.599	2.514	2.4471	2.3928	2.3479	2.2776	2.2033	2.1242	2.0825	2.0391	1.9938	1.9464	1.8963	1.8432
21	4.3248	3.4668	3.0725	2.8401	2.6848	2.5727	2.4876	2.4205	2.366	2.321	2.2504	2.1757	2.096	2.054	2.0102	1.9645	1.9165	1.8657	1.8117
22	4.3009	3.4434	3.0491	2.8167	2.6613	2.5491	2.4638	2.3965	2.3419	2.2967	2.2258	2.1508	2.0707	2.0283	1.9842	1.938	1.8894	1.838	1.7831
23	4.2793	3.4221	3.028	2.7955	2.64	2.5277	2.4422	2.3748	2.3201	2.2747	2.2036	2.1282	2.0476	2.005	1.9605	1.9139	1.8648	1.8128	1.757
24	4.2597	3.4028	3.0088	2.7763	2.6207	2.5082	2.4226	2.3551	2.3002	2.2547	2.1834	2.1077	2.0267	1.9838	1.939	1.892	1.8424	1.7896	1.733
25	4.2417	3.3852	2.9912	2.7587	2.603	2.4904	2.4047	2.3371	2.2821	2.2365	2.1649	2.0889	2.0075	1.9643	1.9192	1.8718	1.8217	1.7684	1.711
26	4.2252	3.369	2.9752	2.7426	2.5868	2.4741	2.3883	2.3205	2.2655	2.2197	2.1479	2.0716	1.9898	1.9464	1.901	1.8533	1.8027	1.7488	1.6906
27	4.21	3.3541	2.9604	2.7278	2.5719	2.4591	2.3732	2.3053	2.2501	2.2043	2.1323	2.0558	1.9736	1.9299	1.8842	1.8361	1.7851	1.7306	1.6717
28	4.196	3.3404	2.9467	2.7141	2.5581	2.4453	2.3593	2.2913	2.236	2.19	2.1179	2.0411	1.9586	1.9147	1.8687	1.8203	1.7689	1.7138	1.6541
29	4.183	3.3277	2.934	2.7014	2.5454	2.4324	2.3463	2.2783	2.2229	2.1768	2.1045	2.0275	1.9446	1.9005	1.8543	1.8055	1.7537	1.6981	1.6376
30	4.1709	3.3158	2.9223	2.6896	2.5336	2.4205	2.3343	2.2662	2.2107	2.1646	2.0921	2.0148	1.9317	1.8874	1.8409	1.7918	1.7396	1.6835	1.6223
40	4.0847	3.2317	2.8387	2.606	2.4495	2.3359	2.249	2.1802	2.124	2.0772	2.0035	1.9245	1.8389	1.7929	1.7444	1.6928	1.6373	1.5766	1.5089
60	4.0012	3.1504	2.7581	2.5252	2.3683	2.2541	2.1665	2.097	2.0401	1.9926	1.9174	1.8364	1.748	1.7001	1.6491	1.5943	1.5343	1.4673	1.3893
120	3.9201	3.0718	2.6802	2.4472	2.2899	2.175	2.0868	2.0164	1.9588	1.9105	1.8337	1.7505	1.6587	1.6084	1.5543	1.4952	1.429	1.3519	1.2539
Inf	3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	1.9384	1.8799	1.8307	1.7522	1.6664	1.5705	1.5173	1.4591	1.394	1.318	1.2214	1

F Table for α **= 0.025** (Click to zoom in)

	DF1	α = 0.025																	
DF2	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	Inf
1	647.79	799.5	864.16	899.58	921.85	937.11	948.22	956.66	963.28	968.63	976.71	984.87	993.1	997.25	1001.4	1005.6	1009.8	1014	1018.3
2	38.506	39	39.166	39.248	39.298	39.332	39.355	39.373	39.387	39.398	39.415	39.431	39.448	39.456	39.465	39.473	39.481	39.49	39.498
3	17.443	16.044	15.439	15.101	14.885	14.735	14.624	14.54	14.473	14.419	14.337	14.253	14.167	14.124	14.081	14.037	13.992	13.947	13.902
4	12.218	10.649	9.9792	9.6045	9.3645	9.1973	9.0741	8.9796	8.9047	8.8439	8.7512	8.6565	8.5599	8.5109	8.461	8.411	8.36	8.309	8.257
5	10.007	8.4336	7.7636	7.3879	7.1464	6.9777	6.8531	6.7572	6.6811	6.6192	6.5245	6.4277	6.3286	6.278	6.227	6.175	6.123	6.069	6.015
6	8.8131	7.2599	6.5988	6.2272	5.9876	5.8198	5.6955	5.5996	5.5234	5.4613	5.3662	5.2687	5.1684	5.1172	5.065	5.012	4.959	4.904	4.849
7	8.0727	6.5415	5.8898	5.5226	5.2852	5.1186	4.9949	4.8993	4.8232	4.7611	4.6658	4.5678	4.4667	4.415	4.362	4.309	4.254	4.199	4.142
8	7.5709	6.0595	5.416	5.0526	4.8173	4.6517	4.5286	4.4333	4.3572	4.2951	4.1997	4.1012	3.9995	3.9472	3.894	3.84	3.784	3.728	3.67
9	7.2093	5.7147	5.0781	4.7181	4.4844	4.3197	4.197	4.102	4.026	3.9639	3.8682	3.7694	3.6669	3.6142	3.56	3.505	3.449	3.392	3.333
10	6.9367	5.4564	4.8256	4.4683	4.2361	4.0721	3.9498	3.8549	3.779	3.7168	3.6209	3.5217	3.4185	3.3654	3.311	3.255	3.198	3.14	3.08
11	6.7241	5.2559	4.63	4.2751	4.044	3.8807	3.7586	3.6638	3.5879	3.5257	3.4296	3.3299	3.2261	3.1725	3.118	3.061	3.004	2.944	2.883
12	6.5538	5.0959	4.4742	4.1212	3.8911	3.7283	3.6065	3.5118	3.4358	3.3736	3.2773	3.1772	3.0728	3.0187	2.963	2.906	2.848	2.787	2.725
13	6.4143	4.9653	4.3472	3.9959	3.7667	3.6043	3.4827	3.388	3.312	3.2497	3.1532	3.0527	2.9477	2.8932	2.837	2.78	2.72	2.659	2.595
14	6.2979	4.8567	4.2417	3.8919	3.6634	3.5014	3.3799	3.2853	3.2093	3.1469	3.0502	2.9493	2.8437	2.7888	2.732	2.674	2.614	2.552	2.487
15	6.1995	4.765	4.1528	3.8043	3.5764	3.4147	3.2934	3.1987	3.1227	3.0602	2.9633	2.8621	2.7559	2.7006	2.644	2.585	2.524	2.461	2.395
16	6.1151	4.6867	4.0768	3.7294	3.5021	3.3406	3.2194	3.1248	3.0488	2.9862	2.889	2.7875	2.6808	2.6252	2.568	2.509	2.447	2.383	2.316
17	6.042	4.6189	4.0112	3.6648	3.4379	3.2767	3.1556	3.061	2.9849	2.9222	2.8249	2.723	2.6158	2.5598	2.502	2.442	2.38	2.315	2.247
18	5.9781	4.5597	3.9539	3.6083	3.382	3.2209	3.0999	3.0053	2.9291	2.8664	2.7689	2.6667	2.559	2.5027	2.445	2.384	2.321	2.256	2.187
19	5.9216	4.5075	3.9034	3.5587	3.3327	3.1718	3.0509	2.9563	2.8801	2.8172	2.7196	2.6171	2.5089	2.4523	2.394	2.333	2.27	2.203	2.133
20	5.8715	4.4613	3.8587	3.5147	3.2891	3.1283	3.0074	2.9128	2.8365	2.7737	2.6758	2.5731	2.4645	2.4076	2.349	2.287	2.223	2.156	2.085
21	5.8266	4.4199	3.8188	3.4754	3.2501	3.0895	2.9686	2.874	2.7977	2.7348	2.6368	2.5338	2.4247	2.3675	2.308	2.246	2.182	2.114	2.042
22	5.7863	4.3828	3.7829	3.4401	3.2151	3.0546	2.9338	2.8392	2.7628	2.6998	2.6017	2.4984	2.389	2.3315	2.272	2.21	2.145	2.076	2.003
23	5.7498	4.3492	3.7505	3.4083	3.1835	3.0232	2.9023	2.8077	2.7313	2.6682	2.5699	2.4665	2.3567	2.2989	2.239	2.176	2.111	2.041	1.968
24	5.7166	4.3187	3.7211	3.3794	3.1548	2.9946	2.8738	2.7791	2.7027	2.6396	2.5411	2.4374	2.3273	2.2693	2.209	2.146	2.08	2.01	1.935
25	5.6864	4.2909	3.6943	3.353	3.1287	2.9685	2.8478	2.7531	2.6766	2.6135	2.5149	2.411	2.3005	2.2422	2.182	2.118	2.052	1.981	1.906
26	5.6586	4.2655	3.6697	3.3289	3.1048	2.9447	2.824	2.7293	2.6528	2.5896	2.4908	2.3867	2.2759	2.2174	2.157	2.093	2.026	1.954	1.878
27	5.6331	4.2421	3.6472	3.3067	3.0828	2.9228	2.8021	2.7074	2.6309	2.5676	2.4688	2.3644	2.2533	2.1946	2.133	2.069	2.002	1.93	1.853
28	5.6096	4.2205	3.6264	3.2863	3.0626	2.9027	2.782	2.6872	2.6106	2.5473	2.4484	2.3438	2.2324	2.1735	2.112	2.048	1.98	1.907	1.829
29	5.5878	4.2006	3.6072	3.2674	3.0438	2.884	2.7633	2.6686	2.5919	2.5286	2.4295	2.3248	2.2131	2.154	2.092	2.028	1.959	1.886	1.807
30	5.5675	4.1821	3.5894	3.2499	3.0265	2.8667	2.746	2.6513	2.5746	2.5112	2.412	2.3072	2.1952	2.1359	2.074	2.009	1.94	1.866	1.787
40	5.4239	4.051	3.4633	3.1261	2.9037	2.7444	2.6238	2.5289	2.4519	2.3882	2.2882	2.1819	2.0677	2.0069	1.943	1.875	1.803	1.724	1.637
60	5.2856	3.9253	3.3425	3.0077	2.7863	2.6274	2.5068	2.4117	2.3344	2.2702	2.1692	2.0613	1.9445	1.8817	1.815	1.744	1.667	1.581	1.482
120	5.1523	3.8046	3.2269	2.8943	2.674	2.5154	2.3948	2.2994	2.2217	2.157	2.0548	1.945	1.8249	1.7597	1.69	1.614	1.53	1.433	1.31
Inf	5.0239	3.6889	3.1161	2.7858	2.5665	2.4082	2.2875	2.1918	2.1136	2.0483	1.9447	1.8326	1.7085	1.6402	1.566	1.484	1.388	1.268	1

F Table for α **= 0.01** (Click to zoom in)

	DF1	α = 0.01																	
DF2	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	Inf
1	4052.2	4999.5	5403.4	5624.6	5763.7	5859	5928.4	5981.1	6022.5	6055.8	6106.3	6157.3	6208.7	6234.6	6260.6	6286.8	6313	6339.4	6365.9
2	98.503	99	99.166	99.249	99.299	99.333	99.356	99.374	99.388	99.399	99.416	99.433	99.449	99.458	99.466	99.474	99.482	99.491	99.499
3	34.116	30.817	29.457	28.71	28.237	27.911	27.672	27.489	27.345	27.229	27.052	26.872	26.69	26.598	26.505	26.411	26.316	26.221	26.125
4	21.198	18	16.694	15.977	15.522	15.207	14.976	14.799	14.659	14.546	14.374	14.198	14.02	13.929	13.838	13.745	13.652	13.558	13.463
5	16.258	13.274	12.06	11.392	10.967	10.672	10.456	10.289	10.158	10.051	9.888	9.722	9.553	9.466	9.379	9.291	9.202	9.112	9.02
6	13.745	10.925	9.78	9.148	8.746	8.466	8.26	8.102	7.976	7.874	7.718	7.559	7.396	7.313	7.229	7.143	7.057	6.969	6.88
7	12.246	9.547	8.451	7.847	7.46	7.191	6.993	6.84	6.719	6.62	6.469	6.314	6.155	6.074	5.992	5.908	5.824	5.737	5.65
8	11.259	8.649	7.591	7.006	6.632	6.371	6.178	6.029	5.911	5.814	5.667	5.515	5.359	5.279	5.198	5.116	5.032	4.946	4.859
9	10.561	8.022	6.992	6.422	6.057	5.802	5.613	5.467	5.351	5.257	5.111	4.962	4.808	4.729	4.649	4.567	4.483	4.398	4.311
10	10.044	7.559	6.552	5.994	5.636	5.386	5.2	5.057	4.942	4.849	4.706	4.558	4.405	4.327	4.247	4.165	4.082	3.996	3.909
11	9.646	7.206	6.217	5.668	5.316	5.069	4.886	4.744	4.632	4.539	4.397	4.251	4.099	4.021	3.941	3.86	3.776	3.69	3.602
12	9.33	6.927	5.953	5.412	5.064	4.821	4.64	4.499	4.388	4.296	4.155	4.01	3.858	3.78	3.701	3.619	3.535	3.449	3.361
13	9.074	6.701	5.739	5.205	4.862	4.62	4.441	4.302	4.191	4.1	3.96	3.815	3.665	3.587	3.507	3.425	3.341	3.255	3.165
14	8.862	6.515	5.564	5.035	4.695	4.456	4.278	4.14	4.03	3.939	3.8	3.656	3.505	3.427	3.348	3.266	3.181	3.094	3.004
15	8.683	6.359	5.417	4.893	4.556	4.318	4.142	4.004	3.895	3.805	3.666	3.522	3.372	3.294	3.214	3.132	3.047	2.959	2.868
16	8.531	6.226	5.292	4.773	4.437	4.202	4.026	3.89	3.78	3.691	3.553	3.409	3.259	3.181	3.101	3.018	2.933	2.845	2.753
17	8.4	6.112	5.185	4.669	4.336	4.102	3.927	3.791	3.682	3.593	3.455	3.312	3.162	3.084	3.003	2.92	2.835	2.746	2.653
18	8.285	6.013	5.092	4.579	4.248	4.015	3.841	3.705	3.597	3.508	3.371	3.227	3.077	2.999	2.919	2.835	2.749	2.66	2.566
19	8.185	5.926	5.01	4.5	4.171	3.939	3.765	3.631	3.523	3.434	3.297	3.153	3.003	2.925	2.844	2.761	2.674	2.584	2.489
20	8.096	5.849	4.938	4.431	4.103	3.871	3.699	3.564	3.457	3.368	3.231	3.088	2.938	2.859	2.778	2.695	2.608	2.517	2.421
21	8.017	5.78	4.874	4.369	4.042	3.812	3.64	3.506	3.398	3.31	3.173	3.03	2.88	2.801	2.72	2.636	2.548	2.457	2.36
22	7.945	5.719	4.817	4.313	3.988	3.758	3.587	3.453	3.346	3.258	3.121	2.978	2.827	2.749	2.667	2.583	2.495	2.403	2.305
23	7.881	5.664	4.765	4.264	3.939	3.71	3.539	3.406	3.299	3.211	3.074	2.931	2.781	2.702	2.62	2.535	2.447	2.354	2.256
24	7.823	5.614	4.718	4.218	3.895	3.667	3.496	3.363	3.256	3.168	3.032	2.889	2.738	2.659	2.577	2.492	2.403	2.31	2.211
25	7.77	5.568	4.675	4.177	3.855	3.627	3.457	3.324	3.217	3.129	2.993	2.85	2.699	2.62	2.538	2.453	2.364	2.27	2.169
26	7.721	5.526	4.637	4.14	3.818	3.591	3.421	3.288	3.182	3.094	2.958	2.815	2.664	2.585	2.503	2.417	2.327	2.233	2.131
27	7.677	5.488	4.601	4.106	3.785	3.558	3.388	3.256	3.149	3.062	2.926	2.783	2.632	2.552	2.47	2.384	2.294	2.198	2.097
28	7.636	5.453	4.568	4.074	3.754	3.528	3.358	3.226	3.12	3.032	2.896	2.753	2.602	2.522	2.44	2.354	2.263	2.167	2.064
29	7.598	5.42	4.538	4.045	3.725	3.499	3.33	3.198	3.092	3.005	2.868	2.726	2.574	2.495	2.412	2.325	2.234	2.138	2.034
30	7.562	5.39	4.51	4.018	3.699	3.473	3.304	3.173	3.067	2.979	2.843	2.7	2.549	2.469	2.386	2.299	2.208	2.111	2.006
40	7.314	5.179	4.313	3.828	3.514	3.291	3.124	2.993	2.888	2.801	2.665	2.522	2.369	2.288	2.203	2.114	2.019	1.917	1.805
60	7.077	4.977	4.126	3.649	3.339	3.119	2.953	2.823	2.718	2.632	2.496	2.352	2.198	2.115	2.028	1.936	1.836	1.726	1.601
120	6.851	4.787	3.949	3.48	3.174	2.956	2.792	2.663	2.559	2.472	2.336	2.192	2.035	1.95	1.86	1.763	1.656	1.533	1.381
Inf	6.635	4.605	3.782	3.319	3.017	2.802	2.639	2.511	2.407	2.321	2.185	2.039	1.878	1.791	1.696	1.592	1.473	1.325	1

F Table for α **= 0.001** (Click to zoom in)

	DF1	α = 0.001																	
DF2	1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	Inf
1	405284	500000	540379	562500	576405	585937	592873	598144	602284	605621	610668	615764	620908	623497	626099	628712	631337	633972	636619
2	998.5	999	999.17	999.25	999.3	999.33	999.36	999.37	999.39	999.4	999.42	999.43	999.45	999.46	999.47	999.47	999.48	999.49	999.5
3	167.03	148.5	141.11	137.1	134.58	132.85	131.58	130.62	129.86	129.25	128.32	127.37	126.42	125.93	125.45	124.96	124.47	123.97	123.47
4	74.137	61.246	56.177	53.436	51.712	50.525	49.658	48.996	48.475	48.053	47.412	46.761	46.1	45.766	45.429	45.089	44.746	44.4	44.051
5	47.181	37.122	33.202	31.085	29.752	28.834	28.163	27.649	27.244	26.917	26.418	25.911	25.395	25.133	24.869	24.602	24.333	24.06	23.785
6	35.507	27	23.703	21.924	20.803	20.03	19.463	19.03	18.688	18.411	17.989	17.559	17.12	16.897	16.672	16.445	16.214	15.981	15.745
7	29.245	21.689	18.772	17.198	16.206	15.521	15.019	14.634	14.33	14.083	13.707	13.324	12.932	12.732	12.53	12.326	12.119	11.909	11.696
8	25.415	18.494	15.829	14.392	13.485	12.858	12.398	12.046	11.767	11.54	11.194	10.841	10.48	10.295	10.109	9.9194	9.7272	9.5321	9.3337
9	22.857	16.387	13.902	12.56	11.714	11.128	10.698	10.368	10.107	9.8943	9.57	9.2381	8.8976	8.7239	8.5476	8.3685	8.1865	8.0014	7.8128
10	21.04	14.905	12.553	11.283	10.481	9.9256	9.5175	9.2041	8.9558	8.7539	8.4452	8.1288	7.8037	7.6376	7.4688	7.2971	7.1224	6.9443	6.7625
11	19.687	13.812	11.561	10.346	9.5784	9.0466	8.6553	8.3548	8.1163	7.9224	7.6256	7.321	7.0076	6.8471	6.6839	6.5178	6.3483	6.1753	5.9983
12	18.643	12.974	10.804	9.6327	8.8921	8.3788	8.0009	7.7104	7.4797	7.292	7.0046	6.7092	6.4048	6.2488	6.0898	5.9278	5.7623	5.5931	5.4195
13	17.815	12.313	10.209	9.0727	8.3541	7.8557	7.4886	7.2061	6.9818	6.7992	6.5192	6.2312	5.934	5.7814	5.6258	5.467	5.3046	5.1381	4.9671
14	17.143	11.779	9.7294	8.6223	7.9218	7.4358	7.0775	6.8017	6.5826	6.4041	6.1302	5.8483	5.5568	5.407	5.2542	5.0979	4.9378	4.7735	4.6042
15	16.587	11.339	9.3353	8.2527	7.5674	7.0917	6.7408	6.4707	6.2559	6.0808	5.8121	5.5351	5.2484	5.1009	4.9502	4.7959	4.6377	4.475	4.307
16	16.12	10.971	9.0059	7.9442	7.2719	6.8049	6.4604	6.195	5.9839	5.8117	5.5473	5.2745	4.9918	4.8462	4.6972	4.5446	4.3878	4.2263	4.0592
17	15.722	10.658	8.7269	7.6831	7.0219	6.5625	6.2234	5.962	5.7541	5.5844	5.3237	5.0544	4.7751	4.6311	4.4836	4.3323	4.1767	4.016	3.8496
18	15.379	10.39	8.4875	7.4593	6.8078	6.355	6.0206	5.7628	5.5575	5.39	5.1324	4.8663	4.5899	4.4471	4.3009	4.1507	3.996	3.836	3.6698
19	15.081	10.157	8.2799	7.2655	6.6225	6.1754	5.8452	5.5904	5.3876	5.2219	4.9672	4.7037	4.4297	4.2881	4.1429	3.9936	3.8396	3.6801	3.5141
20	14.819	9.9526	8.0984	7.096	6.4606	6.0186	5.692	5.44	5.2392	5.0752	4.8229	4.5618	4.29	4.1493	4.005	3.8564	3.703	3.5438	3.3778
21	14.587	9.7723	7.9383	6.9467	6.3179	5.8805	5.5571	5.3076	5.1087	4.9462	4.696	4.4369	4.167	4.0272	3.8836	3.7357	3.5827	3.4237	3.2575
22	14.38	9.612	7.796	6.8142	6.1914	5.758	5.4376	5.1901	4.9929	4.8317	4.5835	4.3262	4.0579	3.9189	3.7759	3.6285	3.4759	3.317	3.1505
23	14.195	9.4685	7.6688	6.6957	6.0783	5.6486	5.3308	5.0853	4.8896	4.7296	4.4831	4.2274	3.9606	3.8222	3.6798	3.5328	3.3804	3.2216	3.0548
24	14.028	9.3394	7.5545	6.5892	5.9768	5.5504	5.2349	4.9912	4.7968	4.6379	4.3929	4.1387	3.8732	3.7354	3.5935	3.4468	3.2946	3.1357	2.9685
25	13.877	9.2225	7.4511	6.4931	5.8851	5.4617	5.1484	4.9063	4.7131	4.5551	4.3116	4.0587	3.7944	3.657	3.5155	3.3692	3.2171	3.0581	2.8904
26	13.739	9.1163	7.3572	6.4057	5.8018	5.3812	5.0698	4.8292	4.6372	4.4801	4.2378	3.9861	3.7228	3.5859	3.4448	3.2987	3.1467	2.9875	2.8193
27	13.613	9.0194	7.2715	6.3261	5.7259	5.3078	4.9983	4.759	4.568	4.4117	4.1706	3.92	3.6576	3.5211	3.3803	3.2344	3.0825	2.9231	2.7543
28	13.498	8.9305	7.1931	6.2532	5.6565	5.2407	4.9328	4.6947	4.5047	4.3491	4.1091	3.8595	3.598	3.4618	3.3213	3.1755	3.0236	2.864	2.6947
29	13.391	8.8488	7.121	6.1863	5.5927	5.1791	4.8727	4.6358	4.4466	4.2917	4.0526	3.8039	3.5432	3.4074	3.2671	3.1215	2.9695	2.8097	2.6397
30	13.293	8.7734	7.0545	6.1245	5.5339	5.1223	4.8173	4.5814	4.393	4.2388	4.0006	3.7527	3.4928	3.3572	3.2171	3.0716	2.9196	2.7595	2.5889
40	12.609	8.2508	6.5945	5.6981	5.1283	4.7306	4.4355	4.207	4.0243	3.8744	3.6425	3.4003	3.145	3.0111	2.8721	2.7268	2.5737	2.4103	2.2326
60	11.973	7.7678	6.1712	5.3067	4.7565	4.3721	4.0864	3.8648	3.6873	3.5415	3.3153	3.0781	2.8266	2.6938	2.5549	2.4086	2.2523	2.0821	1.8905
120	11.38	7.3211	5.7814	4.9472	4.4157	4.0437	3.767	3.5519	3.3792	3.2372	3.0162	2.7833	2.5344	2.4019	2.2621	2.1128	1.9502	1.7667	1.5433
Inf	10.828	6.9078	5.4221	4.6167	4.103	3.743	3.4746	3.2656	3.0975	2.9588	2.7425	2.5132	2.2657	2.1324	1.9901	1.835	1.6601	1.4468	1

Understanding the F Distribution: An Overview

The F distribution, also known as the Snedecor's F distribution or the Fisher-Snedecor distribution, is a continuous probability distribution that arises frequently as the distribution of a test statistic in procedures such as ANOVA and regression analysis. Its core characteristic is that it is the ratio of two independent chi-squared variables, each divided by its respective degree of freedom. Because the underlying variances must be squared, the F distribution is defined only for non-negative values, meaning it is skewed to the right. Unlike the Z or T distributions, it is inherently asymmetric, which is a critical consideration when calculating p-values or interpreting the critical values provided in the F table.

A key concept underlying the F distribution is the comparison of variances. In practice, when we perform an F-test, we are fundamentally asking whether the variance explained by our model (often represented in the numerator) is significantly larger than the unexplained variance or error variance (represented in the denominator). If this ratio--the F-statistic--is large, it suggests that the differences observed are likely not due to random chance, thus providing evidence against the null hypothesis. The shape of the specific F distribution we use in any given test is determined entirely by the two parameters: the numerator degrees of freedom (df_1) and the denominator degrees of freedom (df_2).

The F Distribution Table serves as a crucial lookup tool, necessary because the cumulative distribution function (CDF) for the F distribution is mathematically complex and not easily calculated manually during a hypothesis test. Each physical F-table is constructed for a single specific probability level, typically the upper tail probability ($alpha$), which corresponds to the significance level of the test. Therefore, a complete set of F-tables, such as those provided above, requires separate pages or sections for common alpha levels like 0.10, 0.05, 0.01, and so on. This structure ensures that researchers can quickly isolate the exact critical threshold required for their specified level of risk.

The Mathematical Foundation: What is the F-Statistic?

The F-statistic is the test statistic used in an F-test. Mathematically, it is expressed as the ratio of two independent unbiased estimates of variance, assuming the null hypothesis is true. In the context of ANOVA, the F-statistic is the ratio of the Mean Square Between Groups (MSB) to the Mean Square Within Groups (MSW). MSB represents the variation explained by the different groups or treatments, while MSW represents the error or residual variation within those groups. If the treatments have no effect (i.e., H_0 is true), both MSB and MSW should estimate the same population variance, resulting in an F-ratio close to 1.

When the F-statistic significantly exceeds 1, it suggests that the variance between the groups is substantially greater than the variance within the groups. This large ratio provides the statistical

evidence needed to reject H_0 and conclude that at least one group mean is different from the others. The precise threshold for what constitutes a "significantly large" F-statistic is determined by the critical value found in the F Distribution Table, which is influenced by the sample sizes and the number of groups being compared (i.e., the degrees of freedom). The robust nature of the F-statistic makes it central to comparing the fits of different statistical models.

It is vital to recognize that the F-statistic is always positive because it is a ratio of variances, which are squared deviations. This means that the F-test is inherently a one-tailed test in standard applications like ANOVA, focusing on the upper tail of the distribution. A small F-statistic (close to zero or significantly less than 1) typically means that the variation between the groups is smaller than the random variation within the groups, which simply reinforces the retention of the null hypothesis. However, in certain specialized applications, two-tailed tests might be required when testing for the strict equality of two population variances, where both extremely small and extremely large ratios are of interest, but standard F-tables usually focus on the common one-tailed upper critical region.

Interpreting Degrees of Freedom in the F-Test

The concept of degrees of freedom (df) is perhaps the most crucial element in correctly using the F Distribution Table. Degrees of freedom refer to the number of independent values or pieces of information used to estimate a parameter. In the context of the F-test, we deal with two distinct degrees of freedom, which define the precise shape of the distribution being analyzed. These are the numerator degrees of freedom ($df_{numerator}$ or nu_1) and the denominator degrees of freedom ($df_{denominator}$ or nu_2).

The **numerator degrees of freedom** (nu_1) are associated with the variation being explained by the model or the differences between sample means. In ANOVA, this is typically the number of groups (k) minus one ($k-1$). These values dictate which column of the F-table must be selected. Conversely, the **denominator degrees of freedom** (nu_2) are associated with the error or residual variation--the variation that remains unexplained. In ANOVA, this is typically the total number of observations (N) minus the number of groups (k). These values dictate which row of the F-table must be selected. Getting these two values correct is paramount, as selecting the wrong combination leads to an incorrect critical value and potentially an erroneous conclusion regarding the null hypothesis.

As the degrees of freedom increase, the F distribution curve changes shape, becoming less skewed and approaching a more normal distribution. This is particularly noticeable as the denominator degrees of freedom (nu_2) become large. For very large nu_2, the distribution becomes concentrated around 1. The F Distribution Table reflects this phenomenon by showing that for a fixed $alpha$, the critical value decreases as the degrees of freedom increase. This

statistical relationship highlights why larger sample sizes (which increase nu_2) generally make it easier to detect a true difference or effect, as the required F-statistic threshold for rejection becomes lower.

Locating Critical Values and the Role of Alpha ($alpha$)

The entries within the F Distribution Table are the critical values. A **critical value** is the cutoff point that separates the region of rejection from the region of acceptance for the null hypothesis. These values are intrinsically linked to the significance level, denoted by $alpha$ (alpha). The significance level represents the maximum probability of committing a Type I error--that is, the error of rejecting a true null hypothesis. Common values used in statistical analysis are $alpha = 0.10$, $alpha = 0.05$, $alpha = 0.01$, and $alpha = 0.001$.

Since the F distribution changes significantly depending on $alpha$, each F Distribution Table provided typically corresponds to only one specific alpha level. For instance, the table provided above for $alpha = 0.05$ will contain critical values such that exactly 5% of the total probability density of the corresponding F distribution lies to the right of the critical value. When consulting the tables, the first step is always to select the sheet or section that matches the predetermined significance level chosen for the experiment or test. Using the wrong alpha level will drastically alter the critical value and the resulting inferential decision.

To locate the exact critical value, the researcher must identify the intersection point defined by the two degrees of freedom. First, locate the **numerator degrees of freedom** (nu_1) along the top row. Second, locate the **denominator degrees of freedom** (nu_2) along the leftmost column. The cell where the row and column intersect holds the exact critical value, F_{alpha, nu_1, nu_2}. If the computed F-statistic from the collected data is greater than this critical value, the result is deemed statistically significant at the $alpha$ level, and the researcher rejects the null hypothesis. This systematic approach ensures standardization and reliability in hypothesis testing across disciplines.

Step-by-Step Guide to Using the F Distribution Table

Successfully utilizing the F Distribution Table requires a methodical approach. The process begins long before touching the table, starting with the careful formulation of the hypothesis and the collection of appropriate data. The primary objective is always to determine if the calculated F-statistic warrants the rejection of the null hypothesis based on the pre-selected significance level ($alpha$).

The standard procedure can be broken down into the following key steps, ensuring accuracy in the interpretation of the F-test results.

Define the Hypothesis and Alpha Level: Clearly state the null (H_0) and alternative (H_a) hypotheses, and select the desired significance level ($alpha$), such as 0.05. This choice determines which specific F-table must be used.
Calculate Degrees of Freedom: Determine the numerator degrees of freedom (nu_1) based on the number of groups or variables, and the denominator degrees of freedom (nu_2) based on the total sample size and number of groups.
Locate the Critical Value: Find the F-table corresponding to the chosen $alpha$. Use nu_1 to locate the correct column and nu_2 to locate the correct row. The value at the intersection is the critical value, $F_{critical}$.
Calculate the F-Statistic: Compute the actual F-statistic, $F_{calculated}$, using the sample data, typically by dividing the Mean Square Between by the Mean Square Within.
Make the Decision: Compare $F_{calculated}$ to $F_{critical}$. If $F_{calculated} > F_{critical}$, reject H_0. If $F_{calculated} leq F_{critical}$, fail to reject H_0.

A frequent challenge when using traditional F tables occurs when the exact degrees of freedom are not explicitly listed, particularly for large sample sizes where the denominator df might be 125, but the table only lists 100 and 150. In such cases, linear interpolation may be used to estimate the critical value, although this introduces a minor degree of inaccuracy. More commonly, researchers rely on the slightly more conservative critical value (the higher value, often associated with the lower df) or, ideally, resort to statistical software which calculates the exact p-value or critical value instantaneously, bypassing the need for manual interpolation entirely.

Specific Applications of the F-Test in Statistical Analysis

The F-test, facilitated by the F Distribution Table, is highly versatile and forms the backbone of several major statistical techniques. Its most renowned application is in **Analysis of Variance (ANOVA)**, where it tests the equality of means across three or more independent groups. The F-test in ANOVA determines if the overall variation among group means is statistically significant, providing an umbrella test before performing post-hoc comparisons. Whether conducting a one-way, two-way, or multivariate ANOVA, the reliance on the F distribution remains constant.

Beyond ANOVA, the F-test is crucial in the context of **linear regression analysis**. Here, an F-test is employed to assess the overall significance of the regression model. This specific F-statistic compares the variance explained by the regression model (the Mean Square Regression) against the residual error variance (the Mean Square Error). A significant F-statistic indicates that the predictors, as a group, reliably predict the outcome variable, confirming that the model explains a significant amount of the variation in the dependent variable relative to the error.

Another important application is the use of the F-test to compare the variances of two populations. In this scenario, the F-statistic is simply the ratio of the two sample variances (s_1^2 / s_2^2).

This specific test is often employed as a preliminary step before performing a T-test, as many versions of the T-test require the assumption of equal population variances (homoscedasticity). By comparing the calculated variance ratio to the critical value found in the F Distribution Table (using the appropriate degrees of freedom for each sample), researchers can determine if this key assumption holds true, thus ensuring the validity of their subsequent T-test results.

Modern Alternatives to Physical F Tables

While the physical F Distribution Table remains an excellent pedagogical tool for teaching fundamental concepts of hypothesis testing and serves as a reliable backup, modern statistical analysis overwhelmingly relies on computational methods. Statistical software packages such as R, Python (with libraries like SciPy), SPSS, SAS, and Excel can calculate the exact critical F-value or, more frequently, the precise p-value associated with a calculated F-statistic, eliminating the need for manual table lookups and interpolation errors.

The primary advantage of using statistical software is the precision it offers. Instead of being limited to the discrete degrees of freedom listed in a printed table (e.g., 20, 30, 40), software can handle any continuous degree of freedom, resulting in an exact critical value. Furthermore, most modern reporting emphasizes the **p-value** rather than the critical value comparison. When using software, the output provides the p-value directly. If this p-value is less than the predetermined significance level ($alpha$), the null hypothesis is rejected, streamlining the decision-making process significantly.

Despite the proliferation of software, understanding the structure of the F Distribution Table is essential for conceptual clarity. The tables visually reinforce the relationship between the degrees of freedom and the critical threshold: they clearly illustrate how increasing the denominator degrees of freedom (i.e., increasing the sample size) generally decreases the required F-statistic to achieve significance. Therefore, while computational tools handle the mechanics, mastering the F table structure remains foundational for any professional engaging deeply with inferential statistics.