UNIVERSITY EXAMINATIONS

UNIVERSITEITSEKSAMENS

UNISA university of south africa

IOP2601

May/June 2014
Mei/Junie 2014

ORGANISATIONAL RESEARCH METHODOLOGY
ORGANISASIE NAVORSINGSMETODOLOGIE

Duration : 2 Hours
Tydsduur : 2 Uur

70 Marks
70 Punte

EXAMINERS / EKSAMINATORE :
FIRST / EERSTE MS/ME NN BEKWA DR LE VAN ZYL
SECOND / TWEEDE : PROF FVN CILLIERS

Closed book examination.
Toeboekeksamen.

This paper consists of 23 pages
Hierdie vraestel bestaan uit 23 bladsye.

ENGLISH QUESTIONS START ON PAGE 12
AFRIKAANSE VRAE BEGIN OP BLADSY 18.

ANSWER ALL THE QUESTIONS
BEANTWOORD AL DIE VRAE.

LIST OF FORMULAS / LYS VAN FORMULES

$$\text{midpoint of class interval} = \text{RLL} + \frac{(\text{RUL} - \text{RLL})}{2}$$

$$\text{percentile rank} = \%\text{below} + \frac{\text{score} - \text{RLL}}{\text{class int. width}} (\text{interval } \%)$$

$$\text{score of p} = \text{RLL} + \frac{\text{PR} - \%\text{below}}{\text{interval } \%} (\text{interval width})$$

$$\text{middelpunt van klasinterval} = \text{WOG} + \frac{(\text{WBG} - \text{WOG})}{2}$$

$$\text{persentielrang} = \%\text{onder} + \frac{\text{telling} - \text{WOG}}{\text{klasintervalwydte}} (\text{interval } \%)$$

$$\text{telling van p} = \text{WOG} + \frac{\text{PR} - \%\text{onder}}{\text{interval } \%} (\text{intervalwydte})$$

Mo = Most frequently occurring score

$$\text{Median location} = \frac{N + 1}{2}$$

$$\overline{X} = \frac{\Sigma X}{N} \qquad \overline{Y} = \frac{\Sigma Y}{N}$$

Range = Highest score minus lowest score

$$s_x^2 = \frac{\Sigma X^2 - \frac{(\Sigma X)^2}{N}}{N-1} \qquad s_x = \sqrt{s_x^2}$$

$$s_y^2 = \frac{\Sigma Y^2 - \frac{(\Sigma Y)^2}{N}}{N-1} \qquad s_y = \sqrt{s_y^2}$$

$$r = \frac{N\Sigma XY - \Sigma X \Sigma Y}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

$$b = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{N\Sigma X^2 - (\Sigma X)^2} \qquad a = \overline{Y} - b\overline{X}$$

$$\hat{Y} = bX + a$$

$$z = \frac{X - \mu}{\sigma}$$

$$t = \frac{\overline{D} - 0}{\frac{S_D}{\sqrt{N}}} \qquad df = N - 1$$

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}} \qquad df = N_1 + N_2 - 2$$

$$S_p^2 = \frac{(N_1 - 1)s_1^2 + (N_2 - 1)s_2^2}{N_1 + N_2 - 2} \qquad t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_p^2}{N_1} + \frac{s_p^2}{N_2}}}$$

$$SS_{total} = \Sigma X^2 - \frac{(\Sigma X)^2}{N} \qquad df_{total} = N - 1$$

$$SS_{group} = n\Sigma(\overline{X}_j - \overline{X}..)^2 \qquad df_{group} = k - 1$$

$$SS_{error} = SS_{total} - SS_{group} \qquad df_{error} = k(n - 1)$$

$$MS_{group} = \frac{SS_{group}}{df_{group}} \qquad MS_{error} = \frac{SS_{error}}{df_{error}}$$

$$F = \frac{MS_{group}}{MS_{error}}$$

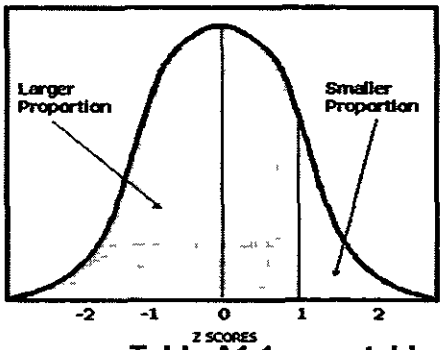
$$\chi^2 = \sum \frac{(O-E)^2}{E}$$

$$E_{ij} = \frac{R_i C_j}{N}$$

$$df = k - 1$$

$$df = (R-1)(C-1)$$

LIST OF TABLES / LYS VAN TABELLE



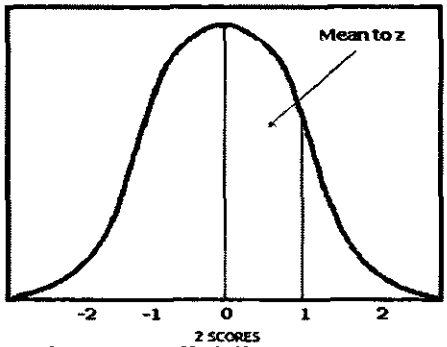


Table A1.1 z-table – the standard normal distribution

z	Smaller *p*	Larger *p*	Mean to z	z	Smaller *p*	Larger *p*	Mean to z	z	Smaller *p*	Larger *p*	Mean to z
0	0 50000	0 50000	0 00000	0.65	0 25785	0 74215	0 24215	1.3	0 09680	0 90320	0 40320
0.01	0 49601	0 50399	0 00399	0.66	0 25463	0 74537	0 24537	1.31	0 09510	0 90490	0 40490
0.02	0 49202	0 50798	0 00798	0.67	0 25143	0 74857	0 24857	1.32	0 09342	0 90658	0 40658
0.03	0 48803	0 51197	0 01197	0.68	0 24825	0 75175	0 25175	1.33	0 09176	0 90824	0 40824
0.04	0 48405	0 51595	0 01595	0.69	0 24510	0 75490	0 25490	1.34	0 09012	0 90988	0 40988
0.05	0 48006	0 51994	0 01994	0.7	0 24196	0 75804	0 25804	1.35	0 08851	0 91149	0 41149
0.06	0 47608	0 52392	0 02392	0.71	0 23885	0 76115	0 26115	1.36	0 08692	0 91308	0 41308
0.07	0 47210	0 52790	0 02790	0.72	0 23576	0 76424	0 26424	1.37	0 08534	0 91466	0 41466
0.08	0 46812	0 53188	0 03188	0.73	0 23270	0 76730	0 26730	1.38	0 08379	0 91621	0 41621
0.09	0 46414	0 53586	0 03586	0.74	0 22965	0 77035	0 27035	1.39	0 08226	0 91774	0 41774
0.1	0 46017	0 53983	0 03983	0.75	0.22663	0 77337	0 27337	1.4	0.08076	0 91924	0 41924
0.11	0 45620	0 54380	0 04380	0.76	0 22363	0 77637	0 27637	1.41	0 07927	0 92073	0 42073
0.12	0 45224	0 54776	0 04776	0.77	0.22065	0 77935	0 27935	1.42	0 07780	0 92220	0 42220
0.13	0 44828	0 55172	0 05172	0.78	0 21770	0 78230	0 28230	1.43	0 07636	0 92364	0 42364
0.14	0 44433	0 55567	0 05567	0.79	0 21476	0 78524	0 28524	1.44	0 07493	0 92507	0 42507
0.15	0 44038	0 55962	0 05962	0.8	0 21186	0 78814	0 28814	1.45	0 07353	0 92647	0 42647
0.16	0 43644	0 56356	0 06356	0.81	0 20897	0 79103	0 29103	1.46	0 07215	0 92785	0 42785
0.17	0 43251	0 56749	0 06749	0.82	0 20611	0 79289	0 29289	1.47	0 07078	0 92922	0 42922
0.18	0 42858	0 57142	0 07142	0.83	0 20327	0 79673	0 29673	1.48	0 06944	0 93056	0 43056
0.19	0 42465	0 57535	0 07535	0.84	0 20045	0 79955	0 29955	1.49	0 06811	0 93189	0 43189
0.2	0 42074	0 57926	0 07926	0.85	0 19766	0 80234	0 30234	1.5	0 06681	0 93319	0 43319
0.21	0 41683	0 58317	0 08317	0.86	0 19489	0 80511	0 30511	1.51	0 06552	0 93448	0 43448
0.22	0 41294	0 58706	0 08706	0.87	0 19215	0 80785	0 30785	1.52	0 06426	0 93574	0 43574
0.23	0 40905	0 59095	0 09095	0.88	0 18943	0 81057	0 31057	1.53	0 06301	0 93699	0 43699
0.24	0 40517	0.59483	0 09483	0.89	0 18673	0 81327	0 31327	1.54	0 06178	0 93822	0 43822
0.25	0 40129	0 59871	0 09871	0.9	0 18406	0 81594	0 31594	1.55	0 06057	0 93943	0 43943
0.26	0 39743	0 60257	0 10257	0.91	0 18141	0 81859	0 31859	1.56	0 05938	0 94062	0 44062
0.27	0 39358	0 60642	0 10642	0.92	0 17879	0 82121	0 32121	1.57	0 05821	0 94179	0 44179
0.28	0 38974	0 61026	0 11026	0.93	0 17619	0 82381	0 32381	1.58	0 05705	0 94295	0 44295
0.29	0.38591	0 61409	0 11409	0.94	0 17361	0 82639	0 32639	1.59	0 55920	0 94408	0 44408
0.3	0 38209	0 61791	0 11791	0.95	0 17106	0 82894	0 32894	1.6	0 05480	0 94520	0 44520
0.31	0 37828	0 62172	0 12172	0.96	0 16853	0 83147	0 33147	1.61	0 05370	0 94630	0 44630
0.32	0 37448	0 62552	0 12552	0.97	0 16602	0 83398	0 33398	1.62	0 05262	0 94738	0 44738
0.33	0 37070	0 62930	0 12930	0.98	0 16354	0 83646	0 33646	1.63	0 05155	0 94845	0 44845
0.34	0 36693	0 63307	0 13307	0.99	0 16109	0 83891	0 33891	1.64	0 05050	0 94950	0 44950
0.35	0 36317	0 63683	0 13683	1	0 15866	0 84134	0 34134	1.65	0 04947	0 95053	0 45053
0.36	0 35942	0 64058	0 14058	1.01	0 15625	0 84375	0 34375	1.66	0 04846	0 95154	0 45154
0.37	0 35569	0 64431	0 14431	1.02	0 15386	0 84614	0 34614	1.67	0 04746	0 95254	0 45254
0.38	0 35197	0 64803	0 14803	1.03	0 15151	0 84849	0 34849	1.68	0 04648	0 95352	0 45352
0.39	0.34827	0 65173	0 15173	1.04	0 14917	0 85083	0 35083	1.69	0 04551	0 95449	0 45449
0.4	0.34458	0 65542	0 15542	1.05	0 14686	0 85314	0 35314	1.7	0 04457	0 95543	0 45543
0.41	0.34090	0 65910	0 15910	1.06	0 14457	0 85543	0 35543	1.71	0 04363	0 95637	0 45637
0.42	0.33724	0 66276	0 16276	1.07	0 14231	0 85769	0 35769	1.72	0 04272	0 95728	0 45728
0.43	0 33360	0 66640	0 16640	1.08	0 14007	0 85993	0 35993	1.73	0 04182	0 95818	0 45818
0.44	0 32991	0 67003	0 17003	1.09	0 13786	0 86214	0 36214	1.74	0 04093	0 95907	0 45907
0.45	0 32636	0 67364	0 17364	1.1	0 13567	0 86433	0 36433	1.75	0 04006	0 95994	0 45994
0.46	0.32276	0 67724	0 17724	1.11	0 13350	0 86650	0 36650	1.76	0 03920	0 96080	0 46080
0.47	0.31918	0 68082	0 18082	1.12	0 13136	0 86864	0 36864	1.77	0 03836	0 96164	0 46164
0.48	0 31561	0 68439	0 18439	1.13	0 12924	0 87076	0 37076	1.78	0 03754	0 96246	0 46246
0.49	0 31207	0 68793	0 18793	1.14	0 12714	0 87286	0 37286	1.79	0 03673	0 96327	0 46327
0.5	0 30854	0 69146	0 19146	1.15	0 12507	0 87493	0 37493	1.8	0 03593	0 96407	0 46407
0.51	0.30503	0 69497	0 19497	1.16	0 12302	0 87698	0 37698	1.81	0 03515	0.96485	0 46485
0.52	0.30153	0 69847	0 19847	1.17	0 12100	0 87900	0 37900	1.82	0 03438	0 96562	0 46562
0.53	0 29806	0 70194	0 20194	1.18	0 11900	0 88100	0 38100	1.83	0 03362	0 96638	0 46638
0.54	0 29460	0 70540	0.20540	1.19	0 11702	0 88289	0 38289	1.84	0 03288	0 96712	0 46712
0.55	0 29116	0 70884	0 20884	1.2	0 11507	0 88493	0 38493	1.85	0 03216	0 96784	0 46784
0.56	0.28774	0 71226	0 21226	1.21	0 11314	0 88686	0 38686	1.86	0 03144	0 96856	0 46856
0.57	0 28434	0 71566	0 21566	1.22	0 11123	0 88877	0 38877	1.87	0 03074	0 96926	0 46926
0.58	0 28096	0 71904	0 21904	1.23	0 10935	0 89065	0 39065	1.88	0 03005	0 96995	0 46995
0.59	0 27760	0 72240	0.22240	1.24	0 10416	0 89251	0 39251	1.89	0 02938	0 97062	0 47062
0.6	0 27425	0 72575	0 22575	1.25	0 10565	0 89435	0 39435	1.9	0 02872	0 97128	0 47128
0.61	0.27093	0 72907	0 22907	1.26	0 10383	0 89617	0 39617	1.91	0 02807	0 97193	0 47193
0.62	0 26763	0 73237	0 23237	1.27	0 10204	0 89796	0 39796	1.92	0 02743	0 97257	0 47257
0.63	0 26435	0 73565	0.23565	1.28	0 10027	0 89973	0 39973	1.93	0 02680	0 97320	0 47320
0.64	0 26109	0 73891	0.23891	1.29	0 09853	0 90147	0 40147	1.94	0 02619	0 97381	0 47381

Table A1.1 *z*-table – the standard normal distribution – *continued*

Z	Smaller *p*	Larger *p*	Mean to *z*	z	Smaller *p*	Larger *p*	Mean to *z*	z	Smaller *p*	Larger *p*	Mean to *z*
1.95	0 02559	0 97441	0 47441	2.6	0 00466	0 99534	0 49534	3.3	0 00048	0 99952	0 49952
1.96	0 02500	0 97500	0 47500	2.61	0 00453	0 99547	0 49547	3.4	0 00034	0 99966	0 49966
1.97	0 02442	0 97558	0 47558	2.62	0 00440	0 99560	0 49560	3.5	0 00023	0 99977	0 49977
1.98	0 02385	0 97615	0 47615	2.63	0 00427	0 99573	0 49573	3.6	0 00016	0 99984	0 49984
1.99	0 02330	0 97670	0 47670	2.64	0 00415	0 99585	0 49585	3.7	0 00011	0 99989	0 49989
2	0 02275	0 97725	0 47725	2.65	0 00402	0 99598	0 49598	3.8	0 00007	0 99993	0 49993
2.01	0 02222	0 97778	0 47778	2.66	0 00391	0 99609	0 49609	3.9	0 00005	0 99995	0 49995
2.02	0 02169	0 97831	0 47831	2.67	0 00379	0 99621	0 49621	4	0 00003	0 99997	0 49997
2.03	0 02118	0 97882	0 47882	2.68	0 00368	0 99632	0 49632	4.1	0 00002	0 99998	0 49998
2.04	0 02068	0 97932	0 47932	2.69	0 00357	0 99643	0 49643	4.2	0 00001	0 99999	0 49999
2.05	0 02018	0 97982	0 47982	2.7	0 00347	0 99653	0 49653				
2.06	0 01970	0 98030	0 48030	2.71	0 00336	0 99664	0 49664				
2.07	0 01923	0 98077	0 48077	2.72	0 00324	0 99674	0 49674				
2.08	0 01876	0 98124	0 48124	2.73	0 00317	0 99683	0 49683				
2.09	0 01831	0 98169	0 48169	2.74	0 00307	0 99693	0 49693				
2.1	0 01786	0 98214	0 48214	2.75	0 00298	0 99702	0 49702				
2.11	0 01743	0 98251	0 48251	2.76	0 00289	0 99711	0 49711				
2.12	0 01700	0 98300	0 48300	2.77	0 00280	0 99720	0 49720				
2.13	0 06590	0 98341	0 48341	2.78	0 00272	0 99728	0 49728				
2.14	0 01618	0 98382	0 48382	2.79	0 00264	0 99736	0 49736				
2.15	0 01780	0 98422	0 48422	2.8	0 00256	0 99744	0 49744				
2.16	0 01539	0 98461	0 48461	2.81	0 00248	0 99752	0 49752				
2.17	0 01500	0 98500	0 48500	2.82	0 00240	0 99760	0 49760				
2.18	0 01463	0 98537	0 48537	2.83	0 00233	0 99767	0 49767				
2.19	0 01426	0 98574	0 48574	2.84	0 00226	0 99774	0 49774				
2.2	0 01390	0 98610	0 48610	2.85	0 00219	0 99781	0 49781				
2.21	0 01355	0 98645	0 48645	2.86	0 00212	0 99788	0 49788				
2.22	0 01321	0 98679	0 48679	2.87	0 00205	0 99795	0 49795				
2.23	0 01287	0 98713	0 48713	2.88	0 00199	0 99801	0 49801				
2.24	0 01255	0 98745	0 48745	2.89	0 00193	0 99807	0 49807				
2.25	0 01222	0 98778	0 48778	2.9	0 00187	0 99813	0 49813				
2.26	0 01191	0 98809	0 48809	2.91	0 00181	0 99819	0 49819				
2.27	0 01160	0 98840	0 48840	2.92	0 00175	0 99825	0 49825				
2.28	0 01130	0 98870	0 48870	2.93	0 00169	0 99831	0 49831				
2.29	0 01101	0 98899	0 48899	2.94	0 00164	0 99836	0 49836				
2.3	0 01072	0 98928	0 48928	2.95	0 00159	0 99841	0 49841				
2.31	0 01044	0 98956	0 48956	2.96	0 00154	0 99846	0 49846				
2.32	0 01017	0 98983	0 48983	2.97	0 00149	0 99851	0 49851				
2.33	0 00990	0 99010	0 49010	2.98	0 00144	0 99856	0 49856				
2.34	0 00964	0 99036	0 49036	2.99	0 00139	0 99861	0 49861				
2.35	0 00939	0 99061	0 49061	3	0 00135	0 99865	0 49865				
2.36	0 00914	0 99086	0 49086	3.01	0 00131	0 99869	0 49869				
2.37	0 00889	0 99111	0 49111	3.02	0 00126	0 99874	0 49874				
2.38	0 00866	0 99134	0 49134	3.03	0 00122	0 99878	0 49878				
2.39	0 00842	0 99158	0 49158	3.04	0 00118	0 99882	0 49882				
2.4	0 00820	0 99180	0 49180	3.05	0 00114	0 99886	0 49886				
2.41	0 00798	0 99202	0 49202	3.06	0 00111	0 99889	0 49889				
2.42	0 00776	0 99224	0 49224	3.07	0 00107	0 99893	0 49893				
2.43	0 00755	0 99245	0 49245	3.08	0 00104	0 99896	0 49896				
2.44	0 00734	0 99266	0 49266	3.09	0 00100	0 99900	0 49900				
2.45	0 00714	0 99286	0 49286	3.1	0 00097	0 99903	0 49903				
2.46	0 00695	0 99305	0 49305	3.11	0 00094	0 99906	0 49906				
2.47	0 00676	0 99324	0 49324	3.12	0 00090	0 99910	0 49910				
2.48	0 00657	0 99343	0 49343	3.13	0 00087	0 99913	0 49913				
2.49	0 00639	0 99361	0 49361	3.14	0 00084	0 99916	0 49916				
2.5	0 00621	0 99379	0 49379	3.15	0 00082	0 99918	0 49918				
2.51	0 00604	0 99396	0 49396	3.16	0 00079	0 99921	0 49921				
2.52	0 00587	0 99413	0 49413	3.17	0 00076	0 99924	0 49924				
2.53	0 00570	0 99430	0 49430	3.18	0 00074	0 99926	0 49926				
2.54	0 00554	0 99446	0 49446	3.19	0 00071	0 99929	0 49929				
2.55	0 00539	0 99461	0 49461	3.2	0 00069	0 99931	0 49931				
2.56	0 00523	0 99477	0 49477	3.21	0 00066	0 99934	0 49934				
2.57	0 00508	0 99492	0 49492	3.22	0 00064	0 99936	0 49936				
2.58	0 00494	0 99506	0 49506	3.23	0 00062	0 99938	0 49938				
2.59	0 00480	0 99520	0 49520	3.24	0 00060	0 99940	0 49940				

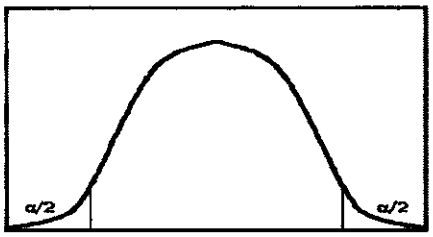
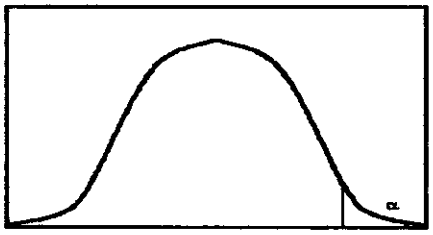


Table A1.2: *t*-table – values of the *t* distribution for varying degrees of freedom (*df*) and α



α for two-tailed test	0.001	0.01	0.02	0.05	0.1	0.2	0.3
α for one-tailed test	0.0005	0.005	0.01	0.025	0.05	0.1	0.15
DEGREES OF FREEDOM (df)							
1	636 5776	63 6559	31 8210	12 7062	6 3137	3 0777	1.9626
2	31 5998	9 9250	6 9645	4 3027	2 9200	1 8856	1 3862
3	12 9244	5.8408	4 5407	3 1824	2 3534	1 6377	1 2498
4	8 6101	4 6041	3 7469	2 7765	2 1318	1 5332	1 1896
5	6 8685	4 0321	3 3649	2 5706	2 0150	1 4759	1 1558
6	5 9587	3.7074	3 1427	2 4469	1 9432	1 4398	1 1342
7	5 4081	3 4995	2 9979	2 3646	1 8946	1 4149	1 1192
8	5 0414	3 3554	2 8965	2 3060	1 8595	1 3968	1 1081
9	4 7809	3 2498	2 8214	2 2622	1 8331	1 3830	1 0997
10	4 5868	3 1693	2 7638	2 2281	1 8125	1 3722	1 0931
11	4 4369	3 1058	2 7181	2 2010	1 7959	1 3634	1 0877
12	4 3178	3 0545	2 6810	2 1788	1 7823	1 3562	1 0832
13	4 2209	3 0123	2 6503	2 1604	1 7709	1 3502	1 0795
14	4 1403	2 9768	2 6245	2 1448	1 7613	1 3450	1 0763
15	4 0728	2 9467	2 6025	2 1315	1 7531	1 3406	1 0735
16	4 0149	2 9208	2 5835	2 1199	1 7459	1 3368	1 0711
17	3 9651	2 8982	2 5669	2 1098	1 7396	1 3334	1 0690
18	3 9217	2 8784	2 5524	2 1009	1 7341	1 3304	1 0672
19	3 8833	2 8609	2 5395	2 0930	1 7291	1 3277	1 0655
20	3 8496	2 8453	2 5280	2 0860	1 7247	1 3253	1 0640
21	3 8193	2 8314	2 5176	2 0796	1 7207	1 3232	1 0627
22	3 7922	2.8188	2 5083	2 0739	1 7171	1 3212	1 0614
23	3 7676	2 8073	2 4999	2 0687	1 7139	1 3195	1 0603
24	3 7454	2 7970	2 4922	2 0639	1 7109	1 3178	1 0593
25	3 7251	2 7874	2 4851	2 0595	1 7081	1 3163	1 0584
26	3 7067	2 7787	2 4786	2 0555	1 7056	1 3150	1 0575
27	3 6895	2 7707	2 4727	2 0518	1 7033	1 3137	1 0567
28	3 6739	2 7633	2 4671	2 0484	1 7011	1 3125	1 0560
29	3 6595	2 7564	2 4620	2 0452	1 6991	1 3114	1 0553
30	3 6460	2 7500	2 4573	2 0423	1 6973	1 3104	1 0547
31	3 6335	2 7440	2 4528	2 0395	1 6955	1 3095	1 0541
32	3 6218	2 7385	2 4487	2 0369	1 6939	1 3086	1 0535
33	3 6109	2 7333	2 4448	2 0345	1 6924	1 3077	1 0530
34	3 6007	2 7284	2 4411	2 0322	1 6909	1 3070	1 0525
35	3 5911	2 7238	2 4377	2 0301	1 6896	1 3062	1 0520
36	3 5821	2 7195	2 4345	2 0281	1 6883	1 3055	1 0516
37	3 5737	2 7154	2 4314	2 0262	1 6871	1 3049	1 0512
38	3 5657	2 7116	2 4286	2 0244	1 6860	1 3042	1 0508
39	3 5581	2 7079	2 4258	2 0227	1 6849	1 3036	1 0504
40	3 5510	2 7045	2 4233	2 0211	1 6839	1 3031	1 0500
45	3 5203	2 6896	2 4121	2 0141	1 6794	1 3007	1 0485
50	3 4960	2 6778	2 4033	2 0086	1 6759	1 2987	1 0473
55	3 4765	2 6682	2 3961	2 0040	1 6730	1 2971	1 0463
60	3 4602	2 6603	2 3901	2 0003	1 6706	1 2958	1 0455
100	3 3905	2 6259	2 3642	1 9840	1 6602	1 2901	1 0418
1000	3 3002	2 5807	2 3301	1 9623	1 6464	1 2824	1 0370

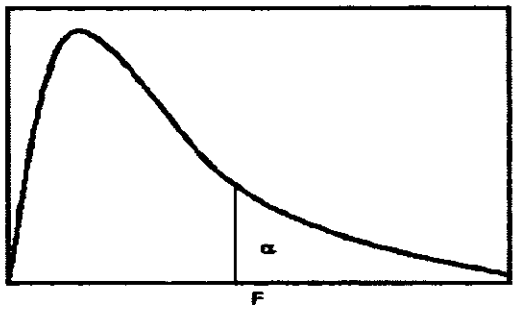


Table A1.4: Table of the F-distribution: $\alpha = 0.05$

Numerator degrees of freedom (df)

Denominator degrees of freedom (df)	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	50	100
1	161 45	199 50	215 71	224 58	230 16	233 99	236 77	238 88	240.54	241 88	245 95	248 01	249 26	250 10	251 14	251 77	253 04
2	18 51	19 00	19 16	19 25	19 30	19 33	19 35	19 37	19 38	19 40	19 43	19 45	19 46	19 46	19 47	19 48	19 49
3	10 13	9.55	9 28	9 12	9 01	8 94	8 89	8 85	8 81	8 79	8 70	8 66	8 63	8 62	8 59	8 58	8 55
4	7 71	6 94	6 59	6 39	6 26	6 16	6 09	6 04	6 00	5 96	5 86	5 80	5 77	5 75	5 72	5 70	5 66
5	6 61	5 79	5 41	5 19	5 05	4 95	4 88	4 82	4 77	4 74	4 62	4 56	4 52	4 50	4 46	4 44	4 41
6	5 99	5 14	4 76	4 53	4 39	4 28	4 21	4 15	4 10	4 06	3 94	3 87	3 83	3 81	3 77	3 75	3 71
7	5 59	4 74	4 35	4 12	3 97	3 87	3 79	3 73	3 68	3 64	3 51	3 44	3 40	3 38	3 34	3 32	3 27
8	5 32	4 46	4 07	3 84	3 69	3 58	3 50	3 44	3 39	3 35	3 22	3 15	3 11	3 08	3 04	3 02	2 97
9	5 12	4 26	3 86	3 63	3 48	3 37	3 29	3 23	3 18	3 14	3 01	2 94	2 89	2 86	2 83	2 80	2 76
10	4 96	4 10	3 71	3 48	3 33	3 22	3 14	3 07	3 02	2 98	2 85	2 77	2 73	2 70	2 66	2 64	2 59
11	4 84	3 98	3 59	3 36	3 20	3 09	3 01	2 95	2 90	2 85	2 72	2 65	2 60	2 57	2 53	2 51	2 46
12	4 75	3 89	3 49	3 26	3 11	3 00	2 91	2 85	2 80	2 75	2 62	2 54	2 50	2 47	2 43	2.40	2 35
13	4 67	3 81	3 41	3 18	3 03	2 92	2 83	2 77	2 71	2 67	2 53	2 46	2 41	2 38	2 34	2 31	2 26
14	4 60	3 74	3 34	3 11	2 96	2 85	2 76	2 70	2 65	2 60	2 46	2 39	2 34	2 31	2 27	2 24	2 19
15	4 54	3 68	3 29	3 06	2 90	2 79	2 71	2 64	2 59	2 54	2 40	2 33	2 28	2 25	2 20	2 18	2 12
16	4 49	3 63	3 24	3 01	2 85	2 74	2 66	2 59	2 54	2 49	2 35	2 28	2 23	2 19	2 15	2 12	2 07
17	4 45	3 59	3 20	2 96	2 81	2 70	2 61	2 55	2 49	2 45	2 31	2 23	2 18	2 15	2 10	2 08	2 02
18	4 41	3 55	3 16	2 93	2 77	2 66	2 58	2 51	2 46	2 41	2 27	2 19	2 14	2 11	2 06	2 04	1 98
19	4 38	3 52	3 13	2 90	2 74	2 63	2 54	2 48	2 42	2 38	2 23	2 16	2 11	2 07	2 03	2 00	1 94
20	4 35	3 49	3 10	2 87	2 71	2 60	2 51	2 45	2 39	2 35	2 20	2 12	2 07	2 04	1 99	1 97	1 91
21	4 32	3 47	3 07	2 84	2 68	2 57	2 49	2 42	2 37	2 32	2 18	2 10	2 05	2 01	1 96	1 94	1 88
22	4 30	3 44	3 05	2 82	2 66	2 55	2 46	2 40	2 34	2 30	2 15	2 07	2 02	1 98	1 94	1 91	1 85
23	4 28	3 42	3 03	2 80	2 64	2 53	2 44	2 37	2 32	2 27	2 13	2 05	2 00	1 96	1 91	1 88	1 82
24	4 26	3 40	3 01	2 78	2 62	2 51	2 42	2 36	2 30	2 25	2 11	2 03	1 97	1 94	1 89	1 86	1 80
25	4 24	3 39	2 99	2 76	2 60	2 49	2 40	2 34	2 28	2 24	2 09	2 01	1 96	1 92	1 87	1 84	1 78
26	4 23	3 37	2 98	2 74	2 59	2 47	2 39	2 32	2 27	2 22	2 07	1 99	1 94	1 90	1 85	1 82	1 76
27	4 21	3 35	2 96	2 73	2 57	2 46	2 37	2 31	2 25	2 20	2 06	1 97	1 92	1 88	1 84	1 81	1 74
28	4 20	3 34	2 95	2 71	2 56	2 45	2 36	2 29	2 24	2 19	2 04	1 96	1 91	1 87	1 82	1 79	1 73
29	4 18	3 33	2 93	2 70	2 55	2 43	2 35	2 28	2 22	2 18	2 03	1 94	1 89	1 85	1 81	1 77	1 71
30	4 17	3 32	2 92	2 69	2 53	2 42	2 33	2 27	2 21	2 16	2 01	1 93	1 88	1 84	1 79	1 76	1 70
35	4 12	3 27	2 87	2 64	2 49	2 37	2 29	2 22	2 16	2 11	1 96	1 88	1 82	1 79	1 74	1 70	1 63
40	4 08	3 23	2 84	2 61	2 45	2 34	2 25	2 18	2 12	2 08	1 92	1 84	1 78	1 74	1 69	1 66	1 59
45	4 06	3 20	2 81	2 58	2 42	2 31	2.22	2 15	2 10	2 05	1 89	1 81	1 75	1 71	1 66	1 63	1 55
50	4 03	3 18	2 79	2 56	2 40	2 29	2 20	2 13	2 07	2 03	1 87	1 78	1 73	1 69	1 63	1 60	1 52
60	4 00	3 15	2 76	2 53	2.37	2 25	2 17	2 10	2 04	1 99	1 84	1 75	1 69	1 65	1 59	1 56	1 48
70	3 98	3 13	2 74	2 50	2.35	2 23	2 14	2 07	2 02	1 97	1 81	1 72	1 66	1 62	1 57	1 53	1 45
80	3 96	3 11	2 72	2 49	2 33	2 21	2 13	2 06	2 00	1 95	1 79	1 70	1 64	1 60	1 54	1 51	1 43
90	3 95	3 10	2 71	2 47	2 32	2 20	2 11	2 04	1 99	1 94	1 78	1 69	1 63	1 59	1 53	1 49	1 41
100	3 94	3 09	2 70	2 46	2 31	2 19	2 10	2 03	1 97	1 93	1 77	1 68	1 62	1 57	1 52	1 47	1 39
200	3 89	3 04	2 65	2 42	2 26	2 14	2 06	1 98	1 93	1 88	1 72	1 62	1 56	1 52	1 46	1 41	1 32
300	3 87	3 03	2 63	2 40	2 24	2 13	2 04	1 97	1 91	1 86	1 70	1 61	1 54	1 50	1 43	1 39	1 30
400	3 86	3 02	2 63	2 39	2 24	2 12	2 03	1 96	1 90	1 85	1 69	1 60	1 53	1 49	1 42	1 38	1 28
500	3 86	3 01	2 62	2 39	2 23	2 12	2 03	1 96	1 90	1 85	1 69	1 59	1 53	1 48	1 42	1 38	1 28
1000	3 85	3 00	2 61	2 38	2 22	2 11	2 02	1 95	1 89	1 84	1 68	1 58	1 52	1 47	1 41	1 36	1 26
10000	3 84	3 00	2 61	2 37	2 21	2 10	2 01	1 94	1 88	1 83	1 67	1 57	1 51	1 46	1 40	1 35	1 25

Table A1.5 Table of the F-distribution: $\alpha = 0.01$

Numerator degrees of freedom (df)

Denominator degrees of freedom (df)	1	2	3	4	5	6	7	8	9	10	15	20	25	30	40	50	100
1	4052 18	4999 50	5403 35	5624 58	5763 65	5858 99	5928 36	5981 07	6022 47	6055 85	6157 29	6208 73	6239 86	6260 65	6286 78	6286 40	6333 90
2	98 50	99 00	99 17	99 25	99 30	99 33	99 36	99 37	99 39	99 40	99 43	99 45	99 46	99 47	99 47	99 48	99 49
3	34 12	30 82	29 46	28 71	28 24	27 91	27 67	27 49	27 35	27 23	26 87	26 69	26 58	26 51	26 41	26 41	26 24
4	21 20	18 00	16 69	15 98	15 52	15 21	14 98	14 80	14 66	14 55	14 20	14 02	13 91	13 84	13 75	13 75	13 58
5	16 26	13 27	12 06	11.39	10 97	10 67	10 46	10 29	10 16	10 05	9 72	9 55	9 45	9 38	9 29	9 29	9 13
6	13 75	10 93	9 78	9 15	8 75	8 47	8 26	8 10	7 98	7 87	7 56	7 40	7 30	7.23	7 14	7 14	6 99
7	12.25	9 55	8 45	7 85	7 46	7 19	6 99	6 84	6 72	6 62	6 31	6 16	6 06	5 99	5 91	5 91	5 75
8	11 26	8 65	7 59	7 01	6 63	6 37	6 18	6 03	5 91	5 81	5 52	5 36	5 26	5.20	5 12	5 12	4 96
9	10 56	8 02	6 99	6 42	6 06	5 80	5 61	5 47	5 35	5 26	4 96	4 81	4 71	4 65	4 57	4 57	4 41
10	10 04	7 56	6 55	5.99	5 64	5 39	5 20	5 06	4 94	4 85	4 56	4 41	4 31	4 25	4 17	4 17	4 01
11	9 65	7.21	6 22	5 67	5 32	5 07	4 89	4 74	4 63	4 54	4 25	4 10	4 01	3 94	3 86	3 86	3 71
12	9 33	6 93	5 95	5 41	5 06	4 82	4 64	4 50	4 39	4 30	4 01	3 86	3 76	3 70	3 62	3 62	3 47
13	9 07	6 70	5 74	5 21	4 86	4 62	4 44	4 30	4 19	4 10	3 82	3 67	3 57	3 51	3 43	3 43	3 27
14	8 86	6 52	5 56	5 04	4 70	4 46	4 28	4 14	4 03	3 94	3 66	3 51	3 41	3 35	3 27	3 27	3 11
15	8 68	6 36	5 42	4 89	4 56	4 32	4 14	4 00	3 90	3 81	3 52	3 37	3 28	3 21	3 13	3 13	2 98
16	8 53	6 23	5 29	4 77	4 44	4 20	4 03	3 89	3 78	3 69	3 41	3 26	3 16	3 10	3 02	3 02	2 86
17	8 40	6 11	5 19	4 67	4 34	4 10	3 93	3 79	3 68	3 59	3 31	3 16	3 07	3 00	2 92	2 92	2 76
18	8 29	6 01	5 09	4 58	4.25	4 02	3 84	3 71	3 60	3 51	3 23	3 08	2 98	2 92	2 84	2.84	2 68
19	8 19	5 93	5 01	4 50	4 17	3 94	3 77	3 63	3 52	3 43	3 15	3 00	2 91	2 84	2 76	2 76	2 60
20	8 10	5 85	4 94	4 43	4 10	3 87	3 70	3 56	3 46	3 37	3 09	2 94	2 84	2 78	2 70	2 69	2 54
21	8 02	5 78	4 87	4 37	4 04	3 81	3 64	3 51	3 40	3 31	3 03	2 88	2 79	2 72	2 64	2 64	2 48
22	7 95	5 72	4 82	4 31	3 99	3 76	3 59	3 45	3 35	3 26	2 98	2 83	2 73	2 67	2 58	2 58	2 42
23	7 88	5 66	4 77	4 26	3 94	3 71	3 54	3 41	3 30	3 21	2 93	2 78	2 69	2 62	2 54	2 54	2 37
24	7 82	5 61	4 72	4 22	3 90	3 67	3 50	3 36	3 26	3 17	2 89	2 74	2 64	2 58	2 49	2 49	2 33
25	7 77	5 57	4 68	4 18	3 86	3 63	3 46	3 32	3 22	3 13	2 85	2 70	2 60	2 54	2 45	2 45	2 29
26	7 72	5 53	4 64	4 14	3 82	3 59	3 42	3 29	3 18	3 09	2 82	2 66	2 57	2 50	2 42	2 42	2 25
27	7 68	5 49	4 60	4 11	3 79	3 56	3 39	3 26	3 15	3 06	2 78	2 63	2 54	2 47	2 38	2 38	2 22
28	7 64	5 45	4 57	4 07	3 75	3 53	3 36	3 23	3 12	3 03	2 75	2 60	2 51	2 44	2 35	2 35	2 19
29	7 60	5 42	4 54	4 05	3 73	3 50	3 33	3 20	3 09	3 01	2 73	2 57	2 48	2 41	2 33	2 33	2 16
30	7 56	5 39	4 51	4 02	3 70	3 47	3 30	3 17	3 07	2 98	2 70	2 55	2 45	2 39	2 30	2 30	2 13
35	7 42	5 27	4 40	3 91	3 59	3 37	3 20	3 07	2 96	2 88	2 60	2 44	2 35	2 28	2 19	2 19	2 02
40	7 31	5 18	4 31	3 83	3 51	3 29	3 12	2 99	2 89	2 80	2 52	2 37	2 27	2 20	2 11	2 11	1 94
45	7 23	5 11	4 25	3 77	3 45	3 23	3 07	2 94	2 83	2 74	2 46	2 31	2 21	2 14	2 05	2 05	1 88
50	7 17	5 06	4 20	3 72	3 41	3 19	3 02	2 89	2 78	2 70	2 42	2 27	2 17	2 10	2 01	2 01	1 82
60	7 08	4 98	4 13	3 65	3 34	3 12	2 95	2 82	2 72	2 63	2 35	2 20	2 10	2 03	1 94	1 94	1 75
70	7 01	4 92	4 07	3 60	3 29	3 07	2 91	2 78	2 67	2 59	2 31	2 15	2 05	1 98	1 89	1 83	1 70
80	6 96	4 88	4 04	3 56	3 26	3 04	2 87	2 74	2 64	2 55	2 27	2 12	2 01	1 94	1 85	1 79	1 65
90	6 93	4 85	4 01	3 53	3 23	3 01	2 84	2 72	2 61	2 52	2 24	2 09	1 99	1 92	1 82	1 76	1 62
100	6 90	4 82	3 98	3 51	3 21	2 99	2 82	2 69	2 59	2 50	2 22	2 07	1 97	1 89	1 80	1 74	1 60
200	6 76	4 71	3 88	3 41	3 11	2 89	2 73	2 60	2 50	2 41	2 13	1 97	1 87	1 79	1 69	1 63	1 48
300	6 72	4 68	3 85	3 38	3 08	2 86	2 70	2 57	2 47	2 38	2 10	1 94	1 84	1 76	1 66	1 59	1 44
400	6 70	4 66	3 83	3 37	3 06	2 85	2 68	2 56	2 45	2 37	2 08	1 92	1 82	1 75	1 64	1 58	1 42
500	6 69	4.65	3 82	3 36	3 05	2 84	2 68	2 55	2 44	2 36	2 70	1 92	1 81	1 74	1 63	1 57	1 41
10^2	6 66	4 63	3 80	3 34	3 04	2 82	2.66	2 53	2 43	2 34	2 06	1 90	1 79	1 72	1 61	1 54	1 38
10^3	6 64	4 61	3 78	3 32	3 02	2 80	2 64	2 51	2 41	2 32	2 04	1 88	1 77	1 70	1 59	1 53	1 36

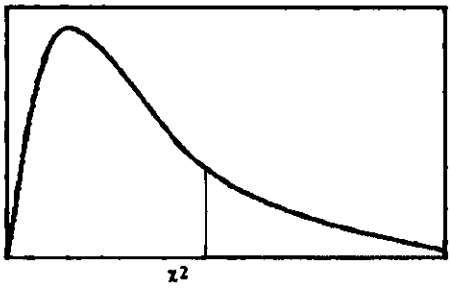


Table A1.7 Values of the χ^2 distribution for varying degrees of freedom (*df*) and α

	α										
	0.0005	**0.001**	**0.005**	**0.01**	**0.025**	**0.05**	**0.1**	**0.15**	**0.2**	**0.25**	**0.3**
1	12.1153	10 8274	7.8794	6 6349	5 0239	3.8415	2 7055	2 0722	1 6424	1.3233	1 0742
2	15.2014	13 8150	10.5965	9 2104	7 3778	5.9915	4 6052	3 7942	3.2189	2 7726	2 4079
3	17.7311	16 2660	12 8381	11 3449	9 3484	7 8147	6 2514	5 3170	4 6416	4 1083	3 6649
4	19 9977	18 4662	14 8602	13 2767	11 1433	9 4877	7 7794	6 7449	5 9886	5 3853	4 8784
5	22.1057	20 5147	16.7496	15 0863	12 8325	11 0705	9 2363	8.1152	7 2893	6 6257	6 0644
6	24 1016	22 4575	18.5475	16 8119	14 4494	12 5916	10 6446	9.4461	8 5581	7 8408	7 2311
7	26 0179	24 3213	20.2777	18 4753	16 0128	14.0671	12 0170	10.7479	9 8032	9 0371	8 3834
8	27 8674	26 1239	21.9549	20 0902	17 5345	15 5073	13 3616	12 0271	11 0301	10 2189	9 5245
9	29 6669	27 8767	23.5893	21 6660	19 0228	16 9190	14 6837	13 2880	12 2421	11 3887	10.6564
10	31 4195	29 5879	25.1881	23 2093	20 4832	18.3070	15 9872	14 5339	13 4420	12 5489	11 7807
11	33 1382	31 2635	26.7569	24 7250	21 9200	19 6752	17 2750	15 7671	14 6314	13 7007	12 8987
12	34 8211	32 9092	28.2997	26 2170	23 3367	21.0261	18 5493	16 9893	15 8120	14 8454	14.0111
13	36 4768	34 5274	29 8193	27 6882	24 7356	22.3620	19 8119	18 2020	16 9848	15 9839	15 1187
14	38 1085	36 1239	31 3194	29 1412	26 1189	23.6848	21 0641	19.4062	18 1508	17 1169	16 2221
15	39 7173	37 6978	32 8015	30 5780	27 4884	24.9958	22 3071	20.6030	19 3107	18.2451	17 3217
16	41.3077	39 2518	34 2671	31 9999	28 8453	26.2962	23 5418	21.7931	20 4651	19 3689	18 4179
17	42.8808	40 7911	35 7184	33 4087	30 1910	27 5871	24 7690	22 9770	21 6146	20 4887	19 5110
18	44 4337	42.3119	37 1564	34 8052	31 5264	28 8693	25 9894	24 1555	22 7595	21 6049	20 6014
19	45 9738	43.8194	38 5821	36 1908	32.8523	30 1435	27 2036	25 3289	23 9004	22 7178	21 6891
20	47 4977	45.3142	39.9969	37 5663	34 1696	31 4104	27 4120	26 4976	25 0375	23 8277	22 7745
21	49 0096	46 7963	41.4009	38 9322	35 4789	32 6706	29 6151	27 6620	26 1711	24 9348	23 8578
22	50 5105	48 2676	42.7957	40 2894	36 7807	33 9245	30 8133	28 8224	27.3015	26 0393	24 9390
23	51 9995	49 7276	44 1814	41 6383	38 0756	35.1725	32 0069	29 9792	24 4288	27 1413	26.0184
24	53 4776	51 1790	45 5584	42 9798	39 3641	36.4150	33 1962	31 1325	29 5533	28 2412	27.0960
25	54 9475	52 6187	49 9280	44 3140	40 6465	37 6525	34 3816	32 2825	30 6752	29 3388	28 1719
26	56 4068	54 0511	48 2898	45 6416	41 9231	38 8851	35 5632	33.4295	31 7946	30 4346	29 2463
27	57 8556	55 4751	49 6450	46 9628	43.1945	40 1133	36 7412	34 5736	32 9117	31 5284	30 3193
28	59 2990	56 8918	50 9936	48 2782	44.4608	41 3372	37 9159	35 7150	34 0266	32 6205	31 3909
29	60 7342	58.3006	52 3355	49 5878	45 7223	42 5569	39 0875	36 8538	35 1394	33 7109	32 4612
30	62 1600	59 1022	53.6719	50 8922	46 9792	43.7730	40 2560	37 9902	36 2502	34 7997	33.5302
31	63 5813	61 0980	55.0025	52 1914	48 2319	44.3853	41 4217	39 1244	37 3591	35.3373	34 5981
32	84 9935	62 4873	56.3280	53 4857	49 4804	48.1942	42 5847	40 2563	38 4663	35 3730	35 6649
33	66 4013	63 8694	57 6423	54 7754	50 7251	47 3999	43 7452	41 3861	39 5718	38 0575	36 7307
34	57 8042	65 2471	58 9637	56 0609	51.9660	48 6024	44 9032	42 5140	40 6756	39 1408	37 7954
35	99 1975	66 6192	60 2748	57 3420	53.2033	49 8018	48 0580	43 6399	41 7780	40 2228	38 8591
36	10 5882	67 3850	61 5811	58 6192	54 4373	50 9985	47 2122	44 7641	42 8788	41 3036	39 9220
37	71 9713	69.3476	62 9832	59 9926	55 6680	52 1923	48 3634	45 8864	43 9782	42.3833	40 9839
38	73 3580	70.7039	64.1812	61 1620	56 8955	53.2835	49 5126	47.0072	45 0763	43 4619	42 0450
39	74 7237	72 0550	65 4753	62 4281	58 1201	54 5722	50.6598	48.1263	46 1730	44 5395	43 1053
40	76 0953	73 4029	66 7660	63 6908	59.3417	55 7585	51 8050	49 2438	47 2685	45 6150	44 1649
45	82 0734	80 0776	73 1660	69 9569	65 4101	61 6562	57 5053	54 8105	52 7288	50 9849	49.4517
50	89 5597	86.6603	79 4898	75 1538	71 4202	57 5048	63 1671	60 3460	58 1638	56 3336	54 7228
55	96 1607	93 1671	85.7491	82 2920	77 3804	73.3115	68 7962	65 8550	53 5772	61.6650	59 9804
60	102 6971	99 6078	91 9518	88 3794	83.2977	79 0820	74 3970	71.3411	68 3721	66 9815	65.2265
100	153 1538	149 4488	140 1697	135 8069	129 5613	124 3421	118 4980	114 6538	111 6567	109 1412	105 9058
1000	1153 7344	1143 9196	1118 9475	1106 3690	1089 5307	1074 6794	1057 7240	1046 2849	1037 8381	1030.1157	1023.2140

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SECTION 1

Please answer the following 20 questions by ONLY giving the answer in ONE word or number. If necessary you can do calculations at the back of your answer sheet but not between the answers.

(1) A dependent variable is characterised by the fact that it is the behaviour measured by the experimenter Is this statement true or false?

(2) On a histogram, which measure of central tendency always refers to the highest point on the distribution?

(3) The median for the scores 7, 5, 4, 8, 2, 1 and 6 is _____.

(4) The scale of measurement with the most quantitative properties is the _____ scale?

(5) A standard deviation of a set of data can be a negative number Is this statement true or false?

(6) What is the critical value for a one-tailed t-test, with *df* = 29 and 1% significance level?

(7) If the variance for the performance score of students is 12,5 and the mean is 32,5, what will the standard deviation be?

(8) The percentage common variance of a 0,75 correlation coefficient is _____?

(9) An exam that was too easy would probably result in a _____ skewed distribution

(10) The *df* for Group = 4
The *df* for Error = 75

What is the value of *N*?

(11) The standard normal distribution has a standard deviation of _____

(12) "There is no difference between the eating habits of males and females during the festive season". This is an example of a _____ hypothesis

(13) "Men are more satisfied with their jobs than women". This alternative hypothesis is an example of a one-tailed (directional) test True/False

Use the data from the table below to answer questions (14) to (17)

Class interval	Frequency	Cumulative frequency	% Frequency	Cumulative % frequency
75 - 80	5	70	7	100
69 - 74	10	65	14	93
63 - 68	14	?	20	79
57 - 62	15	41	21	?
51 - 56	13	26	?	38
45 - 50	13	13	19	19

(14) The cumulative frequency for the class interval [63-68] is _____

(15) The percentage frequency for the class interval [51-56] is _____

(16) The cumulative percentage frequency for the class interval [57-62] is _____.

(17) The interval size for this distribution is _____.

(18) Which measure of central tendency corresponds to the 50th percentile in a distribution?

(19) Students were asked to indicate to which degree they find statistics interesting, to which degree they find it difficult and how much effort they are willing to put into their studies The results of a computed Pearson correlation are presented below Use it to answer the question that follows:

Correlations

		Effort	Interesting	Difficulty
Effort	Pearson Correlation	1	0 454**	-0 224**
	Sig (2-tailed)		0 000	0 001
	N	235	234	233
Interesting	Pearson Correlation	0 454**	1	-0 281**
	Sig (2-tailed)	0 000		0 000
	N	234	234	232
Difficulty	Pearson Correlation	-0 224**	-0 281**	1
	Sig (2-tailed)	0 001	0 000	
	N	233	232	233

Is the correlation between the amount of effort they are willing to invest and the degree to which students find statistics difficult statistically significant? Yes/No

(20) You are working in an organisation with a total number of 168 members You select 100 of these members for your research project and send questionnaires to them. Only 68 of the selected members respond to the questionnaires. The population for the study is therefore _____.

TOTAL SECTION 1: [20]

SECTION 2

QUESTION 1 **[18]**

Your organisation is interested in the relationship between number of hours that the personnel work overtime and their burnout levels You gathered the appropriate data by using the number of overtime hours logged per employee as well as each employee's burnout score measured with the anxiety measurement scale. You analysed the data and found the following

- The relationship between the number of hours overtime and burnout levels was **-0,27**
- The mean of X (number of hours overtime) was **3,7** and the mean of Y (burnout) was **7,0**.
- The slope was **-0,18**

Use the results above to respond to the following questions

(a) Interpret the correlation coefficient. (2)

(b) What deduction can be made about the nature of the relationship? (1)

(c) Calculate the percentage of common variance between the two sets of scores and then illustrate this percentage diagrammatically (2)

When you presented the results of the calculations to your management, you mentioned that you could use a certain formula to predict an employee's burnout levels based on the number of hours worked overtime

(d) What is the value of the intercept? (2)

(e) Calculate the burnout level of an employee who worked 5 hours overtime (1)

(f) Provide a graphic representation of the regression line by indicating the intercept and predicted value for an employee who worked 5 hours overtime (5)

Students also completed the questionnaire to measure their anxiety/stress levels The minimum score that can be obtained is 45 (indicating low levels of burnout) and the maximum score is 80 (indicating high levels of burnout) Use the frequency table below to do the following calculations:

Class interval	Frequency	Cumulative frequency	% Frequency	Cumulative % frequency
75 - 80	8	50	16	100
69 - 74	10	42	20	84
63 - 68	12	32	24	64
57 - 62	8	20	16	40
51 - 56	5	12	10	24
45 - 50	7	7	14	14

(g) If 65 is considered a high risk score for burnout, what is percentage of students that fall below a high risk score? (3)

(h) What is the score at which 35% of all students scored? In other words, what score is found at the 35th percentile? (2)

[TURN OVER]
[BLAAI OM]

QUESTION 2 **[6]**

You collected information from your fellow students on how much they have learned in this module. This was done by asking them for a rating on a 5-point scale on five different questions Given a normally distributed population with a mean (μ) of 12, a standard deviation (σ) of 4, and 250 as the number of cases (N), answer the following questions

(a) What is the **proportion** of students with a raw score larger than 9? (2)

(b) What is the **percentage** of students with a raw score larger than 3? (2)

(c) What is the **number** of students with raw scores between 3 and 9? (2)

QUESTION 3 **[10]**

You are working as a safety officer for a large mining company. As an initiative of the wellness programme of the organisation, you recently presented a training course on safety management to some employees. You are interested to know if older and younger employees differed in terms of their knowledge levels of safety practices. You selected ten older employees and **matched** them with ten younger employees in terms of qualification and job experience As part of the training, the employees completed a questionnaire measuring their current knowledge of safety practices on the mine. The data are presented below

KNOWLEDGE OF SAFETY PRACTICES	
YOUNGER EMPLOYEES	**OLDER EMPLOYEES**
7	5
9	5
5	4
8	3
8	4
6	3
9	4
7	6
8	5
10	6

You would like to determine whether there is a meaningful difference between the knowledge of safety practices scores of younger and older employees You set the level of significance at α = 0,01

(a) Formulate an appropriate null hypothesis (H_0) in symbols. (1)

(b) Formulate an appropriate alternative hypothesis (H_1) in symbols (1)

(c) Assuming that your data are normally distributed, select an appropriate statistical test and calculate the test statistic Show ALL calculations! (3)

$\overline{D} = 3,2$	$s_D = 2,18$

(d) Determine the degrees of freedom (1)

(e) Determine the critical value for a two-tailed test for a significance level of 1% (0,01) (1)

(f) Interpret the results in terms of the rejection or non-rejection of the null hypothesis (1)

(g) Interpret your rejection or non-rejection of the null hypothesis in plain language, in terms of the original problem statement With how much certainty can you conclude this? (2)

QUESTION 4 **[12]**

As a student studying to become a career psychologist, you are interested to know if knowledge of career psychology influences the career maturity of students You measure the career maturity of first, second and third year students studying Industrial Psychology.

CAREER MATURITY		
1st year students	**2nd year students**	**3rd year students**
4	3	10
8	2	8
5	1	9
7	3	8
6	4	7
$\bar{X} = 6,0$	$\bar{X} = 2,6$	$\bar{X} = 8,4$
Total mean $\bar{X} = 5,67$ $\Sigma X = 85$ $\Sigma X^2 = 587$		

You would like to answer the following question. Is there a significant difference in the career maturity of first, second and third year students? Or stated differently, you test the following null hypothesis

$$H_0 \quad \mu_{1st\ year} = \mu_{2nd\ year} = \mu_{3rd\ year} \text{ with } \alpha = 0,01$$

(a) Choose an appropriate test statistic to test this hypothesis and calculate the test statistic Present your answers in a summary table (8)

(b) Determine the critical value that will help you decide whether you should reject the null hypothesis at **a significance level of 0,01,** or not (1)

(c) Do you reject the null hypothesis? (1)

(d) Interpret your findings in terms of the original problem statement (2)

QUESTION 5 **[4]**

The Council for Higher Education is interested to know if there is a difference in the preference of males and females regarding studying at a residential university or at a distance education institution.

In the table below are the responses of the genders to the following question

If you had a choice, you would rather study at a _____
A) residential university
B) distance education institution

	A	B
Males	20	7
Females	5	12

The chi-square value is 8,48.

(a) Determine the critical value **for a significance level of 0,05** (1)

(b) Do you reject the null hypothesis? (1)

(c) Is there a difference between the levels and their answer to the question? With how much certainty can you conclude this? (2)

TOTAL SECTION 2: [50]
GRAND TOTAL: [70]

AFDELING 1

Beantwoord die volgende 20 vrae deur SLEGS die antwoord in EEN woord of getal te verskaf. Indien nodig kan berekeninge op die agterkant van die antwoordbladsy gedoen word, maar nie tussen die antwoorde nie.

(1) 'n Afhanklike veranderlike word gekenmerk deur die feit dat dit die gedrag is wat deur die navorser gemeet word. Is hierdie stelling waar of vals?

(2) Watter maastaf van sentrale neiging verwys altyd na die hoogste punt in die verspreiding van 'n histogram?

(3) Die mediaan vir die tellings 7, 5, 4, 8, 2, 1 en 6 is _____

(4) Die metingskaal met die meeste kwantitatiewe eienskappe is die _____ skaal?

(5) Die standaardafwyking van 'n stel data kan 'n negatiewe syfer wees Is hierdie stelling waar of vals?

(6) Wat is die kritieke woorde vir 'n eenkantige *t*-toets, met *df* = 29 en 'n beduidendheidsvlak van 1%?

(7) Indien die variansie vir die prestasietelling van studente 12,5 is en die gemiddeld 32,5 is, wat sal die standaardafwyking wees?

(8) Die persentasie gemeenskaplike variansie van 'n 0,75 korrelasiekoëffisient is _____?

(9) 'n Eksamen wat te maklik was sal waarskynlik lei tot 'n _____ skewe verspreidig

(10) Die *df* vir Groep = 4
Die *df* vir Fout = 75

Wat is die waarde van *N*?

(11) Die standaard-normaalverspreiding het 'n standaardafwyking van _____

(12) "Daar is geen verskil tussen die eetgewoontes van mans en vroue in die feestyd nie". Hierdie is 'n voorbeeld van 'n _____ hipotese

(13) "Mans is meer tevrede met hul werk as vrouens" Hierdie alternatiewe hipotese is in voorbeeld van 'n eenkantige (rigtinggewende) toets. Waar/Vals.

Gebruik die tabel hieronder om vrae (14) tot (17) te beantwoord

Klasinterval	Frekwensie	Kumulatiewe frekwensie	% Frekwensie	Kumulatiewe % frekwensie
75 - 80	5	70	7	100
71 - 74	10	65	14	93
63 - 68	14	?	20	79
57 - 62	15	41	21	?
51 - 56	13	26	?	38
45 - 50	13	13	19	19

(14) Die kumulatiewe frekwensie vir die klasinterval [63-68] is _____

(15) Die persentasie frekwensie vir die klasinterval [51-56] is _____

(16) Die kumulatiewe persentasie frekwensie vir die klasinterval [57-62] is _____.

(17) Die intervalgrootte vir hierdie verspreiding is _____

(18) Watter maatstaf van sentrale neiging kom ooreen met die 50ste persentiel van 'n verspreiding van tellings?

(19) Studente is gevra om aan te dui in watter mate hulle statistiek interessant vind (Interesting), in watter mate hulle dit moeilik vind (Difficulty) en in watter mate hulle bereid is om moeite te doen met hulle studies (Effort). Die resultate van 'n Pearson-korrelasie wat gedoen is, word hieronder aangebied. Let wel, die uitdruk is slegs in Engels omdat dit so in die statistiese verwekingsprogram aangebied word. Gebruik dit om die vraag te beantwoord wat volg:

Correlations

		Effort	Interesting	Difficulty
Effort	Pearson Correlation	1	0 454**	-0 224**
	Sig (2-tailed)		0 000	0 001
	N	235	234	233
Interesting	Pearson Correlation	0 454**	1	-0 281**
	Sig (2-tailed)	0 000		0 000
	N	234	234	232
Difficulty	Pearson Correlation	-0 224**	-0 281**	1
	Sig (2-tailed)	0 001	0 000	
	N	233	232	233

Is die korrelasie tussen die mate waarin student statistiek moeilik vind (Difficulty) en in watter mate hulle bereid is moeite te doen met hulle studies (Effort) statisties betekenisvol? Ja/Nee

(20) Jy werk in 'n organisasie met 'n totale aantal lede van 168. Jy kies 100 van die lede vir jou navorsing en stuur vraelyste aan hulle Slegs 68 van die gekose lede reageer op die vraelyste Die populasie vir hierdie studie is dus _____

TOTAAL AFDELING 1: [20]

AFDELING 2

VRAAG 1 **[18]**

Jou organisasie stel belang in die verband tussen die aantal ure wat personeel oortyd werk en hul uitbrandingsvlak. Jy versamel die gepaste data deur gebruik te maak van die aantal ure oortyd gelaai per personeellid sowel as elkeen se uitbrandingstelling soos gemeet met die angsmetingskaal Jy ontleed die data en bevind die volgende

- Die verband tussen die aantal ure oortyd gewerk en hulle uitbrandingstelling was **-0,27**
- Die gemiddelde van *X* (aantal ure oortyd gewerk) was **3,7** en die gemiddelde van *Y* (uitbranding) was **7,0**
- Die helling was **-0,18**

Gebruik bogenoemde resultate om die volgende vrae te beantwoord

(a) Interpreteer die korrelasiekoëffisiënt. (2)

(b) Watter afleiding kan gemaak word oor die aard van die verband? (1)

(c) Bereken die persentasie gemeenskaplike variansie tussen die twee stelle tellings en illustreer dit diagrammaties. (2)

Toe jy die resultate van die berekeninge aan bestuur bekendmaak, noem jy dat jy 'n sekere formule kan gebruik om die werknemers se uitbrandingstelling op grond van hulle aantal ure oortyd gewerk kan voorspel.

(d) Wat is die waarde van die afsnit? (2)

(e) Bereken die uitbranding van 'n werknemer wat 5 ure oortyd gewerk het (1)

(f) Gee 'n grafiese voorstelling van die regressielyn deur onderskeidelik die afsnit en die voorspelde waarde van die werknemer wat 5 ure oortydge gewerk het daarop aan te dui (5)

Studente het ook 'n vraelys ingevul wat hulle uitbrandingsvlak meet Die minimum telling wat verkry kan word is 45 (wat aanduiding is dat hulle 'n lae mate van uitbranding ervaar) en die maksimum telling is 80 (wat aanduiding is dat hulle 'n hoë mate van uitbranding ervaar) Gebruik die frekwensieverspreidingstabel hieronder om die volgende berekeninge te doen:

Klasinterval	Frekwensie	Kumulatiewe frekwensie	% Frekwensie	Kumulatiewe % frekwensie
75 - 80	8	50	16	100
69 - 74	10	42	20	84
63 - 68	12	32	24	64
57 - 62	8	20	16	40
51 - 56	5	12	10	24
46 - 50	7	7	14	14

(g) Indien 65 as 'n hoërisikotelling vir uitbranding beskou word, wat is die persentasie studente wat onder 'n hoerisikotelling val? Of anders gestel, bepaal die persentielrang van 'n telling van 65 (3)

(h) Wat is die telling wat 35% van die personeel behaal het? Of anders gestel, watter telling is op die 35ste persentiel? (2)

[TURN OVER]
[BLAAI OM]

VRAAG 2 **[6]**

Jy het inligting oor van jou medestudente versamel oor hoe baie hulle in die module geleer het Hulle moes vyf vrae volgens 'n vyfpuntskaal beantwoord Jy werk met 'n normaal verspreide populasie met 'n gemiddeld (μ) van 12, 'n standaardafwyking (σ) van 4 en 'n aantal gevalle (N) van 250 Beantwoord die volgende vrae

(a) Wat is die **proporsie** van studente met 'n roetelling van groter as 9? (2)

(b) Wat is die **persentasie** van studente met 'n roetelling van groter as 3? (2)

(c) Wat is die **aantal** studente met roetellings tussen 3 en 9? (2)

VRAAG 3 **[10]**

Jy is 'n veiligheidsbeampte by 'n groot mynmaatskappy As inisiatief van die maatskappy se welstandsprogram het jy onlangs 'n opleidingsprogram oor veiligheidsbestuur vir 'n paar werknemers aangebied. Jy wil graag vasstel of ouer en jonger werknemers wat kennis van veiligheidspraktyke betref van mekaar verskil. Jy het 'n group van 10 ouer werknemers geselekteer en op grond van hulle kwalifikasies en werkservaring met 'n groep van 10 jonger werknemers afgepaar As deel van die opleidingsprogram het die werknemers 'n vraelys voltooi wat hulle huidige kennis van veiligheidspraktyke by die myn meet Die data is soos volg

KENNIS VAN VEILIGHEIDSPRAKTYKE	
JONKER WERKNEMERS	**OUER WERKNEMERS**
7	5
9	5
5	4
8	3
8	4
6	3
9	4
7	6
8	5
10	6

Jy wil vasstel of daar 'n betekenisvolle verskil tussen jonger en ouer werknemers se kennis van veiligheidspraktyke bestaan. Jy het op 'n beduidendheidsvlak van $\alpha = 0,01$ besluit

(a) Formuleer 'n gepaste nulhipotese (H_0) in simbole. (1)

(b) Formuleer 'n gepaste alternatiewe hipotese (H_1) in simbole (1)

(c) Aanvaar dat jou data normaal versprei is Kies 'n gepaste statistiese toets en bereken die toetsstatistiek Toon ALLE berekeninge! (3)

$\overline{D} = 3,2$	$s_D = 2,18$

(d) Bepaal die vryheidsgraad. (1)

(e) Bepaal die kritieke waarde vir 'n tweekantige toets vir beduidendheidsvlak van 1% (0,01). (1)

(f) Interpreteer die resultate ten aansien van die verwerping of nie-verwerping van die nulhipotese. (1)

(g) Interpreteer jou verwerping of nie-verwerping van die nulhipotese in gewone taal volgens die oorspronklike probleemstelling Met hoeveel sekerheid kan jy hierdie gevolgtrekking maak? (2)

VRAAG 4 **[12]**

As 'n student wat studeer om 'n loopbaansielkundige te word, stel jy belang om te weet of kennis van loopbaansielkunde die loopbaangereedheidsvlak (*career maturity*) van studente beinvloed Jy het die loopbaangereedheid van eerste-, tweede- en derdejaarsstudente wat Bedryfsielkunde studeer, gemeet

LOOPBAANGEREEDHEIDSVLAK		
1ste jaar studente	**2de jaar studente**	**3de jaar studente**
4	3	10
8	2	8
5	1	9
7	3	8
6	4	7
$\bar{X} = 6,0$	$\bar{X} = 2,6$	$\bar{X} = 8,4$
Totale gemiddelde	$\bar{X} = 5,67$ $\Sigma X = 85$ $\Sigma X^2 = 587$	

Jy wil die volgende vraag beantwoord. Bestaan daar 'n beduidende verskil tussen die drie studentegroep en hulle loopbaangereedheidsvlakke Anders gestel, jy toets die volgende nulhipotese·

$$H_0 \quad \mu_{1ste\ jaar} = \mu_{2de\ jaar} = \mu_{3de\ jaar} \text{ met } \alpha = 0,01$$

(a) Kies 'n gepaste statistiese toets om hierdie hipotese te toets en bereken die toetsstatistiek. Gee jou antwoorde in 'n **opsommingstabel** weer (8)

(b) Bepaal die kritiese waarde wat jou gaan help om te besluit of jy die nulhipotese op 'n **beduidendheidsvlak van 0,01** moet verwerp of nie. (1)

(c) Verwerp jy die nulhipotese? (1)

(d) Interpreteer jou bevindinge in die lig van die oorspronklike probleemstelling (2)

VRAAG 5 **[4]**

Die Raad vir Hoër Onderwys stel belang om te weet of daar 'n verskil is in die voorkeur van onderskeidelik mans en vrouens om hesty by 'n residensiële universiteit of by 'n afstandsonderriginstansie te studeer

In die tabel hieronder word die antwoorde van die twee geslagte op die volgende vraag weergegee

Indien jy 'n keuse gehad het, sou jy eerder by 'n _____ wou studeer

A) residensiele universiteit
B) afstandsonderriginstansie

	A	B
Mans	20	7
Vrouens	5	12

Die chi-kwadraat waarde is 8,48.

(a) Bepaal die kritiese waarde **vir 'n beduidenheidsvlak van 0,05** (1)

(b) Verwerp jy die nulhipotese? (1)

(c) Is daar 'n verskil tussen die geslagsgroepe en hulle antwoord op die vraag? Met hoeveel sekerheid kan jy hierdie gevolgtrekking maak? (2)

TOTAAL AFDELING 2: [50]

GROOTTOTAAL: [70]