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Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2013/2014

COURSE NAME	:	STATISTICS
COURSE CODE	:	DAS 20502
PROGRAMME	:	1 DAT, 2 DAA, 2 DAM
EXAMINATION DATE	:	JUNE 2014
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	A) ANSWER **ALL** QUESTIONS IN **SECTION A** B) ANSWER **TWO (2)** QUESTIONS IN **SECTION B**

THIS QUESTION PAPER CONSISTS OF **THIRTEEN (13)** PAGES

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SECTION A

Q1 A vehicle manufacturing company wants to investigate how the price of one of the motorcycle models depreciates with its age. The research department of the company took a sample of ten motorcycles of this model and collected the following information on the ages (in years) and prices (in thousands of RM) of these motorcycles as shown in **Table Q1**.

Table Q1

Age, x (years)	5	3	2	9	1	4	7	6	8	10
Price, y (thousand)	2.2	2.8	3.5	1.0	4.0	2.6	1.5	1.8	1.2	0.7

(i) Construct a scatter diagram for these data using the graph paper. Does the scatter diagram exhibit a linear relationship between ages and prices of motorcycles?

(4 marks)

(ii) Find S_{xx}, S_{yy} and S_{xy}.

(11 marks)

(iii) Compute the correlation coefficient, r and interpret the result.

(3 marks)

(iv) Find out the slope $\hat{\beta}_1$ and estimates of intercept $\hat{\beta}_0$.

(4 marks)

(v) Find the regression line equation.

(1 marks)

(vi) Predict the price of a 7.5- year-old motorcycle of this model.

(2 marks)

Q2 (a) A manufacturer has developed a new fishing net, which he claims the net has a mean breaking strength of 150 kilograms with a standard deviation of 10 kilograms. To test the eligibility of the claim, a random sample of 50 nets has been tested and it gave a mean of 147 kilograms. Test the claim at a significance level of 0.08.

(12 marks)

(b) On average, a researcher will complete a research in duration of 4 years. A claim has been made that a researcher needs more than 4 years to complete. To test the claim, a random sample of 10 researchers are taken, and the duration (in years) to complete their research are recorded as in **Table Q2** below;

Table Q2

Researcher	1	2	3	4	5	6	7	8	9	10
Duration (years)	3.5	4.2	3.7	4.5	5.0	4.3	3.8	4.1	3.5	3.9

Do these data support the statement that a researcher needs the duration of more than 4 years to complete a research? (Use $\alpha = 0.01$)

(13 marks)

SECTION B

Q3 (a) A potential customer tested five handphones, where the cheapest phone is RM100 and the most expensive phone is RM160. The price differences between each phone is RM15. Find:

(i) Mean

(3 marks)

(ii) Mode

(2 marks)

(iii) Standard deviation

(4 marks)

(b) Farah Azlin have 4 small tokens and 6 big tokens. She then went to a gift machine and insert two tokens inside them, one by one.

(i) Draw the tree diagram.

(3 marks)

(ii) Find the probability that Farah insert one small token and one big token.

(4 marks)

(c) Given that random variable X have the continuous probability density function $f(x)$ is as below, find:

$$f(x) = \begin{cases} 0.25x, & 0 \leq x < 2 \\ (0.25x - 0.5), & 2 \leq x \leq 4 \\ 0, & \text{otherwise} \end{cases}$$

(i) $P(0 \leq X \leq 3)$

(3 marks)

(ii) Expected value, $E(X)$

(4 marks)

(iii) $E(4X - 1)$

(2 marks)

Q4. The mean number of bacteria per cm^3 of liquid is known to be 3. Assuming that the number of bacteria follows a Poisson distribution.

(a) In 1 mL of liquid, find the probability that

(i) There will be no bacteria

(6 marks)

(ii) There will be 4 bacteria

(2 marks)

(b) Determine the mean number of bacteria in 2 mL of liquid and calculate the probability that there will be less than two bacteria

(6 marks)

(c) Find the probability there will be more than 2 bacteria in ½ mL of liquid. Then, identify the mean, and standard deviation.

(11 marks)

Q5 (a) Given a population numbers which are 7, 8.3, 6.6, 7.3, 9.7, 8.6, 7.5, 7, 9.8 and 10.2. If a random sample of 6 drawn from that population, find:

(i) population mean and variance.

(5 marks)

(ii) sample mean and variance.

(3 marks)

(b) A recent study of the average repair cost for the microwave oven is RM55, and a standard deviation of RM 8. The costs are normally distributed.

(i) Write the normal distribution.

(2 marks)

(ii) Write the sampling distribution if a random sample of 12 microwave ovens are repaired.

(3 marks)

(iii) From (ii), find the probability that the mean of the repair bills will be less than RM60.

(5 marks)

(iv) From (ii), find the probability that the mean of the repair bills will be between RM50 and RM55.

(7 marks)

Q6 (a) Find the probability values for:

(i) $P(T \geq 2.681), \quad n = 13$

(2 marks)

(ii) $P(T < 3.767), \quad n = 24$

(3 marks)

(iii) $P(T \geq -2.056), \quad n = 27$

(3 marks)

(b) A study was carried out to estimate the mean height (cm) of 20 years old students in Center for Diploma Studies, UTHM. The variance of the height of such students is $80\ cm^2$.Suppose the sample mean height was $\bar{X} = 145\ cm$.

(i) Find 95% confidence interval for the mean height if random sample of 100 students was selected.

(8 marks)

(ii) Find 90% confidence interval for the mean height if random sample of 23 students was selected.

(9 marks)

- END OF QUESTION –

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Formula

$$\bar{x} \; or \; \mu = \frac{x_1 + x_2 + \cdots + x_n}{N} = \frac{\sum_{i=1}^{n} x_i}{N}$$

$$\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \mu)^2}{N}$$

$$\left(\bar{X} - Z_{\frac{\alpha}{2}}\left(\frac{s}{\sqrt{n}}\right) < \mu < \bar{X} + Z_{\frac{\alpha}{2}}\left(\frac{s}{\sqrt{n}}\right)\right)$$

$$\left(\bar{X} - t_{\frac{\alpha}{2},v}\left(\frac{s}{\sqrt{n}}\right) < \mu < \bar{X} + t_{\frac{\alpha}{2},v}\left(\frac{s}{\sqrt{n}}\right)\right), \quad v = n - 1$$

$$Z = \frac{x - \mu}{\sigma}$$

$$s = \sqrt{\frac{\sum(x - \bar{x}^2)}{n - 1}}$$

$$P(\mathrm{a} \leq \mathrm{X} \leq \mathrm{b}) = [F(x)]_a^b$$

$$E(x) = xf(x) = \int_{-\infty}^{\infty} xf(x)\, dx$$

$$P(X = r) = \frac{e^{-\mu} \cdot \mu^r}{r!} \qquad r = 0, 1, \ldots, \infty$$

$$P(X = r) = {}^nC_r p^r q^{n-r}$$

Calculation of Probability Distribution Functions:

$$P(x \leq a) = \sum_{i=1}^{a} P(x_i) \qquad P(x > a) = 1 - \sum_{i=1}^{a} P(x_i)$$

$$P(a \leq x \leq b) = \sum_{i=a}^{b} P(x_i) \qquad P(a \leq x < b) = \sum_{i=a}^{b-1} P(x_i)$$

$$P(a < x < b) = \sum_{i=a+1}^{b-1} P(x_i) \qquad P(x \geq a) = 1 - \sum_{i=1}^{a-1} P(x_i)$$

$$P(x < a) = \sum_{i=1}^{a-1} P(x_i) \qquad P(a < x \leq b) = \sum_{i=a+1}^{b} P(x_i)$$

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Formula

$$S_{xx} = \sum_{i=1}^{n} x_i^{\;2} - \frac{\left(\sum_{i=1}^{n} x_i\right)^2}{n}$$

$$S_{xy} = \sum_{i=1}^{n} x_i yi - \frac{\left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right)}{n}$$

$$S_{yy} = \sum_{i=1}^{n} y_i^{\;2} - \frac{\left(\sum_{i=1}^{n} y_i\right)^2}{n}$$

$$r = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}}$$

$$\hat{\beta}_1 = \frac{S_{xy}}{S_{xx}}$$

$$\hat{\beta}_0 = \bar{y} - \hat{\beta}_1 \bar{x} = \frac{\sum_{i=1}^{n} y_i}{n} - \hat{\beta}_1 \frac{\sum_{i=1}^{n} x_i}{n}$$

$$Z = \frac{\bar{x} - \mu}{\sigma / \sqrt{n}}$$

$$T = \frac{\bar{x} - \mu}{s / \sqrt{n}}$$

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Table 2

CUMULATIVE POISSON PROBABILITIES

The table gives the probability that r or more random events are contained in an interval when the average number of such events per interval is m, i.e.

$$\sum_{x=r}^{\infty} e^{-m} \frac{m^x}{x!}$$

Where there is no entry for a particular pair of values of r and m, this indicates that the appropriate probability is less than 0.000 05. Similarly, except for the case r = 0 when the entry is exact, a tabulated value of 1.0000 represents a probability greater than 0.999 95.

m =	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
r = 0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	.0952	.1813	.2592	.3297	.3935	.4512	.5034	.5507	.5934	.6321
2	.0047	.0175	.0369	.0616	.0902	.1219	.1558	.1912	.2275	.2642
3	.0002	.0011	.0036	.0079	.0144	.0231	.0341	.0474	.0629	.0803
4		.0001	.0003	.0008	.0018	.0034	.0058	.0091	.0135	.0190
5				.0001	.0002	.0004	.0008	.0014	.0023	.0037
6							.0001	.0002	.0003	.0006
7										.0001

m =	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	2.0
r = 0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	.6671	.6988	.7275	.7534	.7769	.7981	.8173	.8347	.8504	.8647
2	.3010	.3374	.3732	.4082	.4422	.4751	.5068	.5372	.5663	.5940
3	.0996	.1205	.1429	.1665	.1912	.2166	.2428	.2694	.2963	.3233
4	.0257	.0338	.0431	.0537	.0656	.0788	.0932	.1087	.1253	.1429
5	.0054	.0077	.0107	.0143	.0186	.0237	.0296	.0364	.0441	.0527
6	.0010	.0015	.0022	.0032	.0045	.0060	.0080	.0104	.0132	.0166
7	.0001	.0003	.0004	.0006	.0009	.0013	.0019	.0026	.0034	.0045
8			.0001	.0001	.0002	.0003	.0004	.0006	.0008	.0011
9							.0001	.0001	.0002	.0002

m =	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	2.9	3.0
r = 0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	.8775	.8892	.8997	.9093	.9179	.9257	.9328	.9392	.9450	.9502
2	.6204	.6454	.6691	.6916	.7127	.7326	.7513	.7689	.7854	.8009
3	.3504	.3773	.4040	.4303	.4562	.4816	.5064	.5305	.5540	.5768
4	.1614	.1806	.2007	.2213	.2424	.2640	.2859	.3081	.3304	.3528
5	.0621	.0725	.0838	.0959	.1088	.1226	.1371	.1523	.1682	.1847
6	.0204	.0249	.0300	.0357	.0420	.0490	.0567	.0651	.0742	.0839
7	.0059	.0075	.0094	.0116	.0142	.0172	.0206	.0244	.0287	.0335
8	.0015	.0020	.0026	.0033	.0042	.0053	.0066	.0081	.0099	.0119
9	.0003	.0005	.0006	.0009	.0011	.0015	.0019	.0024	.0031	.0038
10	.0001	.0001	.0001	.0002	.0003	.0004	.0005	.0007	.0009	.0011
11					.0001	.0001	.0001	.0002	.0002	.0003
12									.0001	.0001

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m =	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0
r = 0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	.9550	.9592	.9631	.9666	.9698	.9727	.9753	.9776	.9798	.9817
2	.8153	.8288	.8414	.8532	.8641	.8743	.8838	.8926	.9008	.9084
3	.5988	.6201	.6406	.6603	.6792	.6973	.7146	.7311	.7469	.7619
4	.3752	.3975	.4197	.4416	.4634	.4848	.5058	.5265	.5468	.5665
5	.2018	.2194	.2374	.2558	.2746	.2936	.3128	.3322	.3516	.3712
6	.0943	.1054	.1171	.1295	.1424	.1559	.1699	.1844	.1994	.2149
7	.0388	.0446	.0510	.0579	.0653	.0733	.0818	.0909	.1005	.1107
8	.0142	.0168	.0198	.0231	.0267	.0308	.0352	.0401	.0454	.0511
9	.0047	.0057	.0069	.0083	.0099	.0117	.0137	.0160	.0185	.0214
10	.0014	.0018	.0022	.0027	.0033	.0040	.0048	.0058	.0069	.0081
11	.0004	.0005	.0006	.0008	.0010	.0013	.0016	.0019	.0023	.0028
12	.0001	.0001	.0002	.0002	.0003	.0004	.0005	.0006	.0007	.0009
13				.0001	.0001	.0001	.0001	.0002	.0002	.0003
14									.0001	.0001

m =	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0
r = 0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	.9834	.9850	.9864	.9877	.9889	.9899	.9909	.9918	.9926	.9933
2	.9155	.9220	.9281	.9337	.9389	.9437	.9482	.9523	.9561	.9596
3	.7762	.7898	.8026	.8149	.8264	.8374	.8477	.8575	.8667	.8753
4	.5858	.6046	.6228	.6406	.6577	.6743	.6903	.7058	.7207	.7350
5	.3907	.4102	.4296	.4488	.4679	.4868	.5054	.5237	.5418	.5595
6	.2307	.2469	.2633	.2801	.2971	.3142	.3316	.3490	.3665	.3840
7	.1214	.1325	.1442	.1564	.1689	.1820	.1954	.2092	.2233	.2378
8	.0573	.0639	.0710	.0786	.0866	.0951	.1040	.1133	.1231	.1334
9	.0245	.0279	.0317	.0358	.0403	.0451	.0503	.0558	.0618	.0681
10	.0095	.0111	.0129	.0149	.0171	.0195	.0222	.0251	.0283	.0318
11	.0034	.0041	.0048	.0057	.0067	.0078	.0090	.0104	.0120	.0137
12	.0011	.0014	.0017	.0020	.0024	.0029	.0034	.0040	.0047	.0055
13	.0003	.0004	.0005	.0007	.0008	.0010	.0012	.0014	.0017	.0020
14	.0001	.0001	.0002	.0002	.0003	.0003	.0004	.0005	.0006	.0007
15				.0001	.0001	.0001	.0001	.0001	.0002	.0002
16									.0001	.0001

m	5.2	5.4	5.6	5.8	6.0	6.2	6.4	6.6	6.8	7.0
r = 0	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1	.9945	.9955	.9963	.9970	.9975	.9980	.9985	.9986	.9989	.9991
2	.9658	.9711	.9756	.9794	.9826	.9854	.9877	.9897	.9913	.9927
3	.8912	.9052	.9176	.9285	.9380	.9464	.9537	.9600	.9656	.9704
4	.7619	.7867	.8094	.8300	.8488	.8658	.8811	.8948	.9072	.9182
5	.5939	.6267	.6579	.6873	.7149	.7408	.7649	.7873	.8080	.8270
6	.4191	.4539	.4881	.5217	.5543	.5859	.6163	.6453	.6730	.6993
7	.2676	.2983	.3297	.3616	.3937	.4258	.4577	.4892	.5201	.5503
8	.1551	.1783	.2030	.2290	.2560	.2840	.3127	.3419	.3715	.4013
9	.0819	.0974	.1143	.1328	.1528	.1741	.1967	.2204	.2452	.2709
10	.0397	.0488	.0591	.0708	.0839	.0984	.1142	.1314	.1498	.1695
11	.0177	.0225	.0282	.0349	.0426	.0514	.0614	.0726	.0849	.0985
12	.0073	.0096	.0125	.0160	.0201	.0250	.0307	.0373	.0448	.0534
13	.0028	.0038	.0051	.0068	.0088	.0113	.0143	.0179	.0221	.0270
14	.0010	.0014	.0020	.0027	.0036	.0048	.0063	.0080	.0102	.0128
15	.0003	.0005	.0007	.0010	.0014	.0019	.0026	.0034	.0044	.0057
16	.0001	.0002	.0002	.0004	.0005	.0007	.0010	.0014	.0018	.0024
17		.0001	.0001	.0001	.0002	.0003	.0004	.0005	.0007	.0010
18					.0001	.0001	.0001	.0002	.0003	.0004
19								.0001	.0001	.0001

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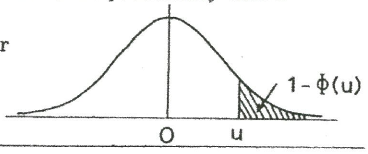
Table 3

AREAS IN TAIL OF THE NORMAL DISTRIBUTION

The function tabulated is $1 - \Phi(u)$ where $\Phi(u)$ is the cumulative distribution function of a standardised Normal variable u. Thus $1 - \Phi(u) = \frac{1}{\sqrt{2\pi}} \int_u^\infty e^{-u^2/2}\,du$ is the probability that a standardised Normal variable selected at random will be greater than a value of u $\left(= \frac{x-\mu}{\sigma}\right)$



$\frac{(x-\mu)}{\sigma}$	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
2.0	.02275	.02222	.02169	.02118	.02068	.02018	.01970	.01923	.01876	.01831
2.1	.01786	.01743	.01700	.01659	.01618	.01578	.01539	.01500	.01463	.01426
2.2	.01390	.01355	.01321	.01287	.01255	.01222	.01191	.01160	.01130	.01101
2.3	.01072	.01044	.01017	.00990	.00964	.00939	.00914	.00889	.00866	.00842
2.4	.00820	.00798	.00776	.00755	.00734	.00714	.00695	.00676	.00657	.00639
2.5	.00621	.00604	.00587	.00570	.00554	.00539	.00523	.00508	.00494	.00480
2.6	.00466	.00453	.00440	.00427	.00415	.00402	.00391	.00379	.00368	.00357
2.7	.00347	.00336	.00326	.00317	.00307	.00298	.00289	.00280	.00272	.00264
2.8	.00256	.00248	.00240	.00233	.00226	.00219	.00212	.00205	.00199	.00193
2.9	.00187	.00181	.00175	.00169	.00164	.00159	.00154	.00149	.00144	.00139
3.0	.00135									
3.1	.00097									
3.2	.00069									
3.3	.00048									
3.4	.00034									
3.5	.00023									
3.6	.00016									
3.7	.00011									
3.8	.00007									
3.9	.00005									
4.0	.00003									

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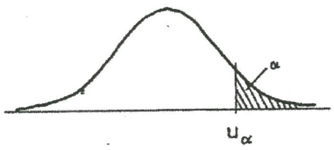
Table 4

PERCENTAGE POINTS OF THE NORMAL DISTRIBUTION

The table gives the 100α percentage points, u_α, of a standardised Normal distribution where $\alpha = \frac{1}{\sqrt{2\pi}} \int_{u_\alpha}^{\infty} e^{-u^2/2}\,du$. Thus u_α is the value of a standardised Normal variate which has probability α of being exceeded.



α	u_α	α	u_α	α	u_α	α	u_α	α	u_α	α	u_α
.50	0.0000	.050	1.6449	.030	1.8808	.020	2.0537	.010	2.3263	.050	1.6449
.45	0.1257	.048	1.6646	.029	1.8957	.019	2.0749	.009	2.3656	.010	2.3263
.40	0.2533	.046	1.6849	.028	1.9110	.018	2.0969	.008	2.4089	.001	3.0902
.35	0.3853	.044	1.7060	.027	1.9268	.017	2.1201	.007	2.4573	.0001	3.7190
.30	0.5244	.042	1.7279	.026	1.9431	.016	2.1444	.006	2.5121	.00001	4.2649
.25	0.6745	.040	1.7507	.025	1.9600	.015	2.1701	.005	2.5758	.025	1.9600
.20	0.8416	.038	1.7744	.024	1.9774	.014	2.1973	.004	2.6521	.005	2.5758
.15	1.0364	.036	1.7991	.023	1.9954	.013	2.2262	.003	2.7478	.0005	3.2905
.10	1.2816	.034	1.8250	.022	2.0141	.012	2.2571	.002	2.8782	.00005	3.8906
.05	1.6449	.032	1.8522	.021	2.0335	.011	2.2904	.001	3.0902	.000005	4.4172

Table 5

ORDINATES OF THE NORMAL DISTRIBUTION

The table gives $\phi(u)$ for values of the standardised Normal variate, u, in the interval 0.0(0.1)4.0 where $\phi(u) = \frac{1}{\sqrt{2\pi}} e^{-u^2/2}$

u	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0.0	.3989	.3970	.3910	.3814	.3683	.3521	.3332	.3123	.2897	.2661
1.0	.2420	.2179	.1942	.1714	.1497	.1295	.1109	.0940	.0790	.0656
2.0	.0540	.0440	.0355	.0283	.0224	.0175	.0136	.0104	.0079	.0060
3.0	.0044	.0033	.0024	.0017	.0012	.0009	.0006	.0004	.0003	.0002
4.0	.0001									

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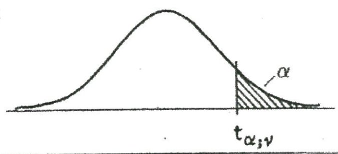
Table 7

PERCENTAGE POINTS OF THE t DISTRIBUTION

The table gives the value of $t_{\alpha;\nu}$ — the 100α percentage point of the t distribution for ν degrees of freedom.

The values of t are obtained by solution of the equation:-

$$\alpha = \Gamma\{\tfrac{1}{2}(\nu+1)\}\{\Gamma(\tfrac{1}{2}\nu)\}^{-1}(\nu\pi)^{-1/2}\int_t^{\infty}(1 + x^2/\nu)^{-(\nu+1)/2}dx$$



Note. The tabulation is for one tail only i.e. for positive values of t. For |t| the column headings for α must be doubled.

$\alpha =$	0.10	0.05	0.025	0.01	0.005	0.001	0.0005
ν = 1	3.078	6.314	12.706	31.821	63.657	318.31	636.62
2	1.886	2.920	4.303	6.965	9.925	22.326	31.598
3	1.638	2.353	3.182	4.541	5.841	10.213	12.924
4	1.533	2.132	2.776	3.747	4.604	7.173	8.610
5	1.476	2.015	2.571	3.365	4.032	5.893	6.869
6	1.440	1.943	2.447	3.143	3.707	5.208	5.959
7	1.415	1.895	2.365	2.998	3.499	4.785	5.408
8	1.397	1.860	2.306	2.896	3.355	4.501	5.041
9	1.383	1.833	2.262	2.821	3.250	4.297	4.781
10	1.372	1.812	2.228	2.764	3.169	4.144	4.587
11	1.363	1.796	2.201	2.718	3.106	4.025	4.437
12	1.356	1.782	2.179	2.681	3.055	3.930	4.318
13	1.350	1.771	2.160	2.650	3.012	3.852	4.221
14	1.345	1.761	2.145	2.624	2.977	3.787	4.140
15	1.341	1.753	2.131	2.602	2.947	3.733	4.073
16	1.337	1.746	2.120	2.583	2.921	3.686	4.015
17	1.333	1.740	2.110	2.567	2.898	3.646	3.965
18	1.330	1.734	2.101	2.552	2.878	3.610	3.922
19	1.328	1.729	2.093	2.539	2.861	3.579	3.883
20	1.325	1.725	2.086	2.528	2.845	3.552	3.850
21	1.323	1.721	2.080	2.518	2.831	3.527	3.819
22	1.321	1.717	2.074	2.508	2.819	3.505	3.792
23	1.319	1.714	2.069	2.500	2.807	3.485	3.767
24	1.318	1.711	2.064	2.492	2.797	3.467	3.745
25	1.316	1.708	2.060	2.485	2.787	3.450	3.725
26	1.315	1.706	2.056	2.479	2.779	3.435	3.707
27	1.314	1.703	2.052	2.473	2.771	3.421	3.690
28	1.313	1.701	2.048	2.467	2.763	3.408	3.674
29	1.311	1.699	2.045	2.462	2.756	3.396	3.659
30	1.310	1.697	2.042	2.457	2.750	3.385	3.646
40	1.303	1.684	2.021	2.423	2.704	3.307	3.551
60	1.296	1.671	2.000	2.390	2.660	3.232	3.460
120	1.289	1.658	1.980	2.358	2.617	3.160	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.090	3.291

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