THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

A Committee of the Council of ICPAU

CPA (U) EXAMINATIONS

LEVEL ONE

QUANTITATIVE TECHNIQUES – PAPER 2

TUESDAY 26 NOVEMBER, 2019

INSTRUCTIONS TO CANDIDATES:

1. Time allowed: **3 hours 15 minutes.**

   The first 15 minutes of this examination have been designated for reading time. You may not start to write your answer during this time.

2. This examination contains **six** question and only **five** questions are to be attempted. Each question carries 20 marks.

3. Formulae and tables are provided on pages 9 – 14.

4. Write your answer to each question on a fresh page in your answer booklet.

5. Please, read further instructions on the answer booklet, before attempting any question.

Attempt five of the six questions

Question 1

(a) Explain the importance of a frequency polygon. **(2 marks)**

(b) In 2016, a survey was carried out to find the number of people engaged in productive agriculture before they could be advanced money from wealth creation project. The results of the survey are summarised in the table below.

Age	Male	Female.
20 - 24	2,168	2,118
25 - 29	2,072	2,022
30 – 34	2,035	1,978
35 – 39	2,088	2,021
40 – 44	1,794	1,741
45 – 49	1,803	1,775
50 – 54	1,434	1,443
55 – 59	1,235	1,283
60 – 64	1,045	1,175
65 – 69	815	1,097
70 – 74	594	1,003
80 – 84	287	626

Required:

Use the data in the table to calculate:

(i) the mean age of the entire population that was surveyed.

(6 marks)

(ii) median age of the female population that was surveyed.

(3 marks)

(c) In a sample of 150 married couples, the relationship between the age of a husband and age of the wife were investigated. The results are illustrated in a two way frequency table below

Age of wife (y)	Age of husband (x)						
	10-19	20-29	30-39	40-49	50-59	60-69	70-79
10 - 19	5	3					
20 - 29	1	25	7	2			
30 - 39		1	28	5	1	1	
40 - 49		1	2	24	4		
59 - 59				3	18		
60 - 69					1	11	2
70 - 79						1	4

Required:

(i) Illustrate the above data on the same frequency polygon.

(8 marks)

(ii) Hence compare the age distribution for couples in the sample.

(1 mark)

(Total 20 marks)

Question 2

(a) (i) Distinguish between complimentary events and exhaustive events in probability theory.

(2 marks)

(ii) A question paper of mathematics and statistics contains 10 questions divided in two sections of 5 questions each.

Required:

Determine the number of ways a candidate can select 6 questions, selecting at least two questions from each section.

(4 marks)

(b) A factory which produces garden tools makes both the blades and blade handles. The length of a blade is approximately normal with a mean of 30 cm and standard deviation of 1 cm and the length of the blade handle is also normally distributed with a mean of 78 cm and standard deviation 5 cm. Assuming the assembled blades with handles will have a length normally distributed.

Required:

What percentage of the assembled blades will have length exceeding 110 cm?

(6 marks)

(c) A discotheque uses two types of batteries in their remote control system manufactured by different companies. The standard deviation of the lifetime for the Never die batteries is 3.1 hours and for Everlasting batteries is 2.9 hours. A random sample of 80 Never die and 90 Everlasting were tested and their mean lifetime were 7.9 hours and 8.2 hours respectively.

Required:

Test at 5 % level of significance whether there is any evidence of difference between the mean lifetimes of the two types of batteries.

(8 marks)

(Total 20 marks)

Question 3

(a) The cost of energy for 2017 and 2018 for a modest family in Jinja town is shown in the table below.

	2017		2018	
	Price (shs)	Quantity	Price (shs)	Quantity
Charcoal	4,363	76 bags	4,649	80 bags
Fuel	2,604	552 litres	2,696	3,000 litres
Electricity (yaka)	550	11,490 units	560	540 units
Gas	14,040	14,500 kg	15,000	13,200 kg

Required:

Compute Paasche index using 2017 as the base year.

(4 marks)

(b) A quality control director wishes to set up control charts for the manufacture of plastic tubing. The variable of interest is the amount of pressure required to rapture the tubing. Twenty random samples of size 10 were used and yielded the following results.

Sample mean $\overline{X}$ $\bar{\bar{X}}$	$\overline{X_1}$	$\bar{\bar{X}}$	$\overline{X_3}$	$\overline{X_4}$	$\overline{X_5}$	$\overline{X_6}$	$\overline{X_7}$	$\overline{X_8}$	$\overline{X_9}$	$\overline{X_{10}}$
	8	9	10	11	9	9	8	10	10	10
Sample range R	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8	R_9	R_{10}
	2	1	2	0	2	3	1	1	2	2

Sample mean $\overline{X}$	$\overline{X_{11}}$	$\overline{X_{12}}$	$\overline{X_{13}}$	$\overline{X_{14}}$	$\overline{X_{15}}$	$\overline{X_{16}}$	$\overline{X_{17}}$	$\overline{X_{18}}$	$\overline{X_{19}}$	$\overline{X_{20}}$
	9	9	8	9	9	11	8	10	10	10
Sample range R	R_{11}	R_{12}	R_{13}	R_{14}	R_{15}	R_{16}	R_{17}	R_{18}	R_{19}	R_{20}
	1	1	1	2	2	2	1	3	1	1

Required:

(i) Calculate the value of $\overline{X}$ and $\overline{R}$. **(7 marks)**

(ii) Determine the upper and lower control limits for $\overline{X}\,\bar{x}$ chart using ($n=20, A_2=0.308$) **(3 marks)**

(iii) Plot the mean data values on the control chart and hence determine whether the process is in control or not. **(6 marks)**

(Total 20 marks)

Question 4

(a) Explain the main causes of deviation of sample data from population data in the process of sampling.

(2 marks)

(b) The following grades A, B, C, D, E and F were scored by 12 candidates in Accounting and taxation interviews, and the overall grades were based on the interview results from both subjects.

Candidate	1	2	3	4	5	6	7	8	9	10	11	12
Overall	A	B	B	C	C	C	D	D	D	E	F	F
Accounting	B	C	A	D	C	B	C	E	D	D	E	F
Taxation	C	A	C	B	D	E	C	C	E	D	F	E

Required:

Compute Spearman's rank correlation coefficient:

(i) Between overall grades and Accounting grades. **(6 marks)**

(ii) Between overall grades and Taxation grades and hence

(5 marks)

(iii) Determine with a reason which of the grades was a better predictor of the overall grades.

(2 marks)

(c) The following table shows the monthly sales volume of a firm in million shillings.

Month	2017	2018
January	26.0	31.4
February	25.1	30.8
March	24.5	28.9
April	24.0	30.3
May	25.6	30.1
June	25.0	29.2
July	24.4	27.6
August	22.7	25.3
September	24.0	26.0
October	24.1	28.2
November	23.4	27.7
December	23.0	28.4

Required:

Compute the 12 monthly centred moving averages. **(5 marks)**

(Total 20 marks)

Question 5

(a) A manufacturer estimates that when Q units of a particular commodity are produced, the total cost will be $C(Q) = \frac{1}{8}Q^2 + 3Q + 98$ $C(Q) = \frac{1}{8}Q^2 + 3Q + 98$ thousand shillings and further more $P(Q) = \frac{1}{3}(75 - Q)$ $P(Q) = \frac{1}{3}(75 - Q)$ thousand shillings per unit is the price at which all Q units will be sold.

Required:

Find the marginal cost and marginal revenue.

(5 marks)

(b) The cost function of a firm is given by $C(Q) = 2Q^2 + 100Q + 3600$ $C(Q) = 2Q^2 + 100Q + 3600$ and the revenue function is given by $R(Q) = 500Q - 2Q^2$ $R(Q) = 500Q - 2Q^2$.

Required:

(i) Find the value of Q that yields maximum profit.

(5 marks)

(ii) Hence determine the maximum revenue attained when the profit level is at maximum.

(2 marks)

(c) A manager of a shop in a busy shopping mall on Bigo Avenue found out that his profit per annum (million shillings) follows a relation $p = 11 + 24n - 3n^2$ $p = 11 + 24n - 3n^2$ where n is hours spent on the shop per month.

Required:

(i) Represent $p = 11 + 24n - 3n^2$ on the graph (use a range of 1 - 8 months) **(5 marks)**

(ii) What is the most profitable length of time for him to be at the shopping mall? **(1 mark)**

(iii) How long will it take him to get a profit of Shs 43,000,000? **(2 marks)**

(Total 20 marks)

Question 6

(a) Explain the following terms in the context of project network analysis.

(i) Dummy activity. **(1 mark)**

(ii) Crashing. **(1 mark)**

(b) Gonda Clock Company produces clocks of two types regular and deluxe. The electrical components necessary are supplied by another company whose supply is limited to 600 components per day. Each regular clock requires 5 components and each deluxe clock requires 6 components. The production of one regular clock requires 1 man day of labour, while 2 man days are required for deluxe, the production labour force has on daily basis 160 man days. The production takes place in 2 different departments for each type of clock. The daily departmental capacity for regular is 80 and for deluxe is 60. A profit of Shs 5,000 is possible for regular and Shs 8,000 for each deluxe.

Required:

(i) Using graphical method determine how many regular and deluxe clocks should be produced on a daily basis so as to maximize profit.

(12 marks)

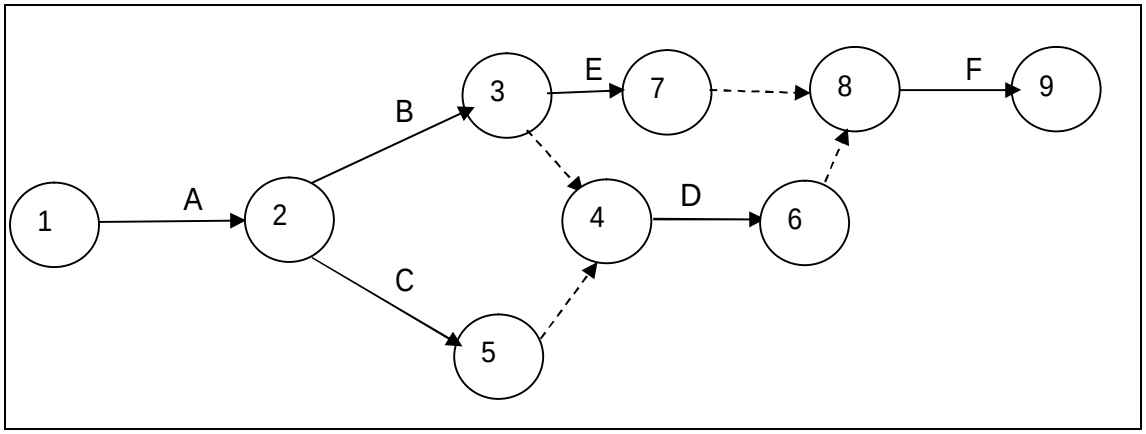
(ii) Determine the maximum profit expected on a daily basis.

(1 mark)

(c) The table shows activities, their immediate predecessors and duration in a project.

Activity	Immediate predecessor	Duration (days).
A	-	6
B	A	9
C	A	8
D	B, C	4
E	B	6
F	D, E	6

In the initial design of the project dummies were used to make a network as shown in the net work diagram below.



Required:

(i) Re-modal the network to reduce the dummy activities.

(2 marks)

(ii) Hence determine critical activities of the project.

(3 marks)

(Total 20 marks)

FORMULAE

1. Combination $^{n}C_{r} = \frac{n!}{(n-r)!r!}$
2. Permutations $^{n}p_{r} = \frac{n!}{(n-r)!}$
3. Mean of the binomial distribution = np
4. Standard deviation = $\sqrt{npq}$
5. Variance of the binomial distribution = $np(1-p)$
6. Standard error of population proportion $S_{ps} = \sqrt{\frac{pq}{n}}$
7. Spearman's rank correlation coefficient $r = 1 - \frac{6\sum d^2}{n(n^2-1)}$
8. Product moment coefficient of correlation = $\frac{n\sum xy - \sum x \sum y}{\sqrt{(n\sum x^2 - (\sum x)^2) \times (n\sum y^2 - (\sum y)^2)}}$
9. Cost slope = $\frac{\text{crash cost – normal cost}}{\text{normal time – crash time}}$
10. Harmonic mean (ungrouped data) $hm = \frac{n}{\sum \frac{1}{x}}$
11. Sample mean $\bar{x} = \frac{\sum x}{n}$
12. Harmonic mean (grouped data) $hm = \frac{n}{\sum \frac{f}{x}}$
13. Quartile coefficient of dispersion = $\frac{Q_3 - Q_1}{Q_3 + Q_1}$
14. Bowley's coefficient of skeweness = $\frac{Q_3 + Q_1 - 2Q_2}{Q_{3-} Q_1}$
15. Mean $\bar{x} = A + \frac{\sum fd}{\sum f}$ or Mean $\bar{x} = \frac{\sum fx}{\sum f}$

16. Median $= Lb + \left(\dfrac{\frac{N}{2} - Cfb}{fm} \right) C$

17. Mode $= lm + \left(\dfrac{d_1}{d_1 + d_2} \right) C$

18. Variance $Var(x) = \dfrac{\sum fx^2}{\sum f} - \left(\dfrac{\sum fx}{\sum f} \right)^2$

19. Standard deviation $\delta = \sqrt{\dfrac{\sum fx^2}{\sum f} - \bar{x}^2} \qquad = \sqrt{\dfrac{\sum f(x-\bar{x})^2}{\sum f}}$

20. Sample standard deviation $s = \sqrt{\dfrac{\sum (x-\bar{x})^2}{n-1}}$

21. Least squares regression equation of y on x is given by; $y = a + bx$

    Where; $b = \dfrac{n\sum xy - \sum x \sum y}{n\sum x^2 - \left(\sum x\right)^2}$ and $a = \dfrac{\sum y}{n} - \dfrac{b\sum x}{n}$

22. Least squares regression equation of x on y is given by; x = c +dy

    Where $c = \dfrac{\sum x}{n} - \dfrac{d\sum y}{n}$ and $d = \dfrac{n\sum xy - \sum x \sum y}{n\sum y^2 - (\sum y)^2}$

23. Standardising normal. $z = \dfrac{\bar{x} - \mu}{\sigma}$

24. Central Limit theorem $\dfrac{x - \bar{x}_2}{\sqrt{\dfrac{\sigma_1^2 + \sigma_2^2}{n_1 + n_2}}}$

24. Confidence interval for sample mean $= \bar{x} \pm t_{\alpha/2} \dfrac{s}{\sqrt{n}}$

25. $\chi^2 = \sum \dfrac{(O-E)^2}{E}$

26. Confidence interval of proportion $= p \pm z_{\alpha/2} \sqrt{\dfrac{pq}{n}}$

27. Pearson coefficient of skewness $Sk = \dfrac{(\bar{x} - \text{mode})}{s_d}$ or $Sk = \dfrac{3\left(\bar{x} - median\right)}{s_d}$

28. Expectation $= \sum xP(X = x)$

29. Laspeyres' price index = $\frac{\sum(p_1 \times q_0)}{\sum(q_0 \times p_0)} \times 100$

30. Paasche's Model = $\frac{\sum(p_1 \times q_1)}{\sum(q_1 \times p_0)} \times 100$

31. Weighted aggregate price index $= \frac{\sum wv_n}{\sum wv_0} \times 100$

32. Additive law of probability; $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

33. Conditional probability $P\left(A/B\right) = \frac{P(A \cap B)}{P(B)}$

34. Independence of A, B $P\left(A/B\right) = P(A) or P(A \cap B) = P(A) \times P(B)$

35. Continuous compounding $A = P(1+r)^n + \frac{b(1+r)^n - b}{r}$

36. Quotient rule of differentiation $f = \frac{vu^1 - uv^1}{v^2}$; where $f = \frac{u}{v}$

37. $Poisson Model P\left(X = x\right) = e^{-\lambda} \frac{\lambda^x}{x!}$

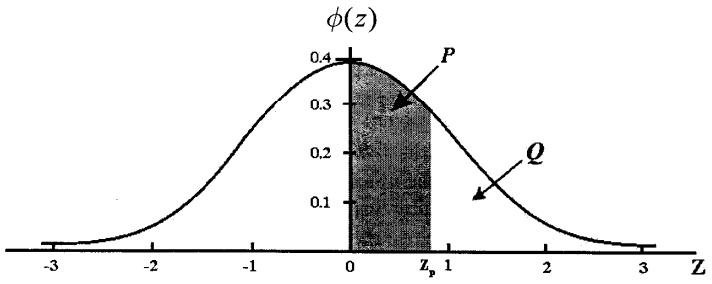
CUMULATIVE NORMAL DISTRIBUTION $P(z)$

Z	0	1	2	3	4	5	6	7	8	9	ADD 1	2	3	4	5	6	7	8	9
0.0	0.0000	0040	0080	0120	0160	0199	0239	0279	0319	0359	4	8	12	16	20	24	28	32	36
0.1	0.0398	0438	0478	0517	0557	0596	0636	0675	0714	0753	4	8	12	16	20	24	28	32	36
0.2	0.0793	0832	0871	0910	0948	0987	1026	1064	1103	1141	4	8	12	15	19	22	27	31	35
0.3	0.1179	1217	1255	1293	1331	1368	1406	1443	1480	1517	4	8	11	15	19	22	26	30	34
0.4	0.1554	1591	1628	1664	1700	1736	1772	1808	1844	1879	4	7	11	14	18	22	25	29	32
0.5	0.1915	1950	1985	2019	2054	2088	2123	2157	2190	2224	3	7	10	14	17	21	24	27	31
0.6	0.2257	2291	2324	2357	2389	2422	2454	2486	2517	2549	3	6	10	13	16	19	23	26	29
0.7	0.2580	2611	2642	2673							3	6	9	12	15	19	22	25	28
					2704	2734	2764	2794	2823	2852	3	6	9	12	15	18	21	24	27
0.8	0.2881	2910	2939	2967	2995	3023					3	6	8	11	14	17	20	22	25
							3051	3078	3106	3133	3	5	8	11	13	16	19	22	24
0.9	0.3159	3186	3212	3238	3264	3289					3	5	8	10	13	16	18	21	23
							3315	3340	3365	3389	2	5	7	10	12	15	17	20	22
1.0	0.3413	3438	3461	3485	3508						2	5	7	10	12	14	17	19	22
						3531	3554	3577	3599	3621	2	4	7	9	11	13	15	18	20
1.1	0.3643	3665	3686	3708							2	4	6	8	11	13	15	17	19
					3729	3749	3770	3790	3810	3830	2	4	6	8	10	12	14	16	18
1.2	0.3849	3869	3888	3907	3925						2	4	6	8	10	11	13	15	17
						3944	3962	3980	3997	4015	2	4	5	7	9	11	13	14	16
1.3	0.4032	4049	4066	4082	4099	4115	4131	4147	4162	4177	2	3	5	6	8	10	11	13	14
1.4	0.4192	4207	4222	4236	4251	4265	4279	4292	4306	4319	1	3	4	6	7	8	10	11	13
1.5	0.4332	4345	4357	4370	4382	4394	4406	4418	4429	4441	1	2	4	5	6	7	8	10	11
1.6	0.4452	4463	4474	4484	4495	4505	4515	4525	4535	4545	1	2	3	4	5	6	7	8	9
1.7	0.4554	4564	4573	4582	4591	4599	4608	4616	4625	4633	1	2	3	3	4	5	6	7	8
1.8	0.4641	4649	4656	4664	4671	4678	4686	4693	4699	4706	1	1	2	3	4	4	5	6	6
1.9	0.4713	4719	4726	4732	4738	4744	4750	4756	4761	4767	1	1	2	2	3	4	4	5	5
2.0	0.4772	4778	4783	4788	4793	4798	4803	4808	4812	4817	0	1	1	2	2	3	3	4	4
2.1	0.4821	4826	4830	4834	4838	4842	4846	4850	4854	4957	0	1	1	2	2	2	3	3	4
2.2	0.4861	4864	4868	4871	4875	4878	4881	4884	4887	4890	0	1	1	1	2	2	2	3	3
2.3	0.4893	4896	4898	4901	4904	4906	4909	4911	4913	4916	0	0	1	1	1	2	2	2	2
2.4	0.4918	4920	4922	4925	4927	4929	4931	4932	4934	4936	0	0	1	1	1	1	1	2	2
2.5	0.4938	4940	4941	4943	4945	4946	4948	4949	4951	4952									
2.6	0.4953	4955	4956	4957	4959	4960	4961	4962	4963	4964									
2.7	0.4965	4966	4967	4968	4969	4970	4971	4972	4973	4974									
2.8	0.4974	4975	4976	4977	4977	4978	4979	4979	4980	4981									
2.9	0.4981	4982	4982	4983	4984	4984	4985	4985	4986	4986									
3.0	0.4987	4990	4993	4995	4997	4998	4998	4999	4999	5000									

The table gives $P(z) = \int_0^z \phi(z)dz$

If the random variable Z is distributed as the standard normal distribution N(0,1) then:

1. $P(\text{o} < Z < z_p) = P(\text{Shaded Area})$
2. $P(Z > Z_p) = Q = ½ - P$
3. $P(Z > |Z_p|) = 1 - 2P = 2Q$



PERCENTAGE POINTS OF THE CHI-SQUARE (χ^2) DISTRIBUTION χ^2_Q

	Probability Q									
ν	0.995	0.990	0.975	0.950	0.100	0.050	0.025	0.010	0.005	0.001
1	0.0^4393	0.0^3157	0.0^3982	0.0^2393	2.706	3.841	5.024	6.635	7.879	10.83
2	0.0100	0.0201	0.0506	0.1026	4.605	5.991	7.378	9.210	10.60	13.82
3	0.0717	0.1148	0.2158	0.3518	6.251	7.815	9.348	11.34	12.84	16.27
4	0.2070	0.2971	0.4844	0.7107	7.779	9.488	11.14	13.28	14.86	18.47
5	0.4117	0.5543	0.8312	1.145	9.236	11.07	12.83	15.09	16.75	20.52
6	0.6757	0.8721	1.237	1.635	10.64	12.59	14.45	16.81	18.55	22.46
7	0.9893	1.239	1.690	2.167	12.02	14.07	16.01	18.48	20.28	24.32
8	1.344	1.646	2.180	2.733	13.36	15.51	17.53	20.09	21.95	26.12
9	1.735	2.088	2.700	3.325	14.68	16.92	19.02	21.67	23.59	27.88
10	2.156	2.558	3.247	3.940	15.99	18.31	20.48	23.21	25.19	29.59
11	2.603	3.053	3.816	4.575	17.28	19.68	21.92	24.73	26.76	31.26
12	3.074	3.571	4.404	5.226	18.55	21.03	23.34	26.22	28.30	32.91
13	3.565	4.107	5.009	5.892	19.81	22.36	24.74	27.69	29.82	34.53
14	4.075	4.660	5.629	6.571	21.06	23.68	26.12	29.14	31.32	36.12
15	4.601	5.229	6.262	7.261	22.31	25.00	27.49	30.58	32.80	37.70
16	5.142	5.812	6.908	7.962	23.54	26.30	28.85	32.00	34.27	39.25
17	5.697	6.408	7.564	8.672	24.77	27.59	30.19	33.41	35.72	40.79
18	6.265	7.015	8.231	9.390	25.99	28.87	31.53	34.81	37.16	42.31
19	6.844	7.633	8.907	10.12	27.20	30.14	32.85	36.19	38.58	43.82
20	7.434	8.260	9.591	10.85	28.41	31.41	34.17	37.57	40.00	45.31
21	8.034	8.897	10.28	11.59	29.62	32.67	35.48	38.93	41.40	46.80
22	8.643	9.542	10.98	12.34	30.81	33.92	36.78	40.29	42.80	48.27
23	9.260	10.20	11.69	13.09	32.01	35.17	38.08	41.64	44.18	49.73
24	9.886	10.86	12.40	13.85	33.20	36.42	39.36	42.98	45.56	51.18
25	10.52	11.52	13.12	14.61	34.38	37.65	40.65	44.31	46.93	52.62
26	11.16	12.20	13.84	15.38	35.56	38.89	41.92	45.64	48.29	54.05
27	11.81	12.88	14.57	16.15	36.74	40.11	43.19	46.96	49.64	55.48
28	12.46	13.56	15.31	16.93	37.92	41.34	44.46	48.28	50.99	56.89
29	13.12	14.26	16.05	17.71	39.09	42.56	45.72	49.59	52.34	58.30
30	13.79	14.95	16.79	18.49	40.26	43.77	46.98	50.89	53.67	59.70
40	20.71	22.16	24.43	26.51	51.81	55.76	59.34	63.69	66.77	73.40
50	27.99	29.71	32.36	34.76	63.17	67.50	71.42	76.15	79.49	86.66
60	35.53	37.48	40.48	43.19	74.40	79.08	83.30	88.38	91.95	99.61
70	43.28	45.44	48.76	51.74	85.53	90.53	95.02	100.4	104.2	112.3
80	51.17	53.54	57.15	60.39	96.58	101.9	106.6	112.3	116.3	124.8
90	59.20	61.75	65.65	69.13	107.6	113.1	118.1	124.1	128.3	137.2
100	67.33	70.06	74.22	77.93	118.5	124.3	129.6	135.8	140.2	149.4

The function tabulated is χ^2_Q defined by

$$\int_{\chi^2_Q}^{\infty} f(x)dx = Q; \quad f(x) = \frac{1}{2^{\nu/2}(\frac{1}{2}\nu - 1)!} x^{\nu/2-1} e^{-x/2} (x > 0)$$

where $f(x)$ is the probability density of the χ^2 distribution for ν degrees of freedom. Interpolation ν-wise for $\nu > 30$ gives adequate values (but errors up to 5 units in the last figure may occur for the smaller ν). For $\nu > 100$ the distribution of $\sqrt{(2\chi^2)}$ is approximately normal with mean $\sqrt{(2\nu - 1)}$ and unit variance.

Note: $0.0^4 2 = 0.00002$
$0.0^3 3 = 0.0003$
$0.0^2 4 = 0.004$

PERCENTAGE POINTS OF STUDENT'S t – DISTRIBUTION t_Q

	Probability*									
ν	0.25	0.10	0.05	0.025	0.01	0.005	0.0025	0.001	0.0005	Q
	0.50	0.20	0.10	0.050	0.02	0.010	0.0050	0.002	0.0010	$2Q$
1	1.000	3.078	6.314	12.71	31.82	63.66	127.3	318.3	636.6	
2	0.816	1.886	2.920	4.303	6.965	9.925	14.09	22.33	31.60	
3	0.765	1.638	2.353	3.182	4.541	5.841	7.453	10.21	12.92	
4	0.741	1.533	2.132	2.776	3.747	4.604	5.598	7.173	8.610	
5	0.727	1.476	2.015	2.571	3.365	4.032	4.773	5.893	6.869	
6	0.718	1.440	1.943	2.447	3.143	3.707	4.317	5.208	5.959	
7	0.711	1.415	1.895	2.365	2.998	3.499	4.029	4.785	5.408	
8	0.706	1.397	1.860	2.306	2.896	3.355	3.833	4.501	5.041	
9	0.703	1.383	1.833	2.262	2.821	3.250	3.690	4.297	4.781	
10	0.700	1.372	1.812	2.228	2.764	3.169	3.581	4.144	4.587	
11	0.697	1.363	1.796	2.201	2.718	3.106	3.497	4.025	4.437	
12	0.695	1.356	1.782	2.179	2.681	3.055	3.428	3.930	4.318	
13	0.694	1.350	1.771	2.160	2.650	3.012	3.372	3.852	4.221	
14	0.692	1.345	1.761	2.145	2.624	2.977	3.326	3.787	4.140	
15	0.691	1.341	1.753	2.131	2.602	2.947	3.286	3.733	4.073	
16	0.690	1.337	1.746	2.120	2.583	2.921	3.252	3.686	4.015	
17	0.689	1.333	1.740	2.110	2.567	2.898	3.222	3.646	3.965	
18	0.688	1.330	1.734	2.101	2.552	2.878	3.197	3.610	3.922	
19	0.688	1.328	1.729	2.093	2.539	2.861	3.174	3.579	3.883	
20	0.687	1.325	1.725	2.086	2.528	2.845	3.153	3.552	3.850	
21	0.686	1.323	1.721	2.080	2.518	2.831	3.135	3.527	3.819	
22	0.686	1.321	1.717	2.074	2.508	2.819	3.119	3.505	3.792	
23	0.685	1.319	1.714	2.069	2.500	2.807	3.104	3.485	3.767	
24	0.685	1.318	1.711	2.064	2.492	2.797	3.091	3.467	3.745	
25	0.684	1.316	1.708	2.060	2.485	2.787	3.078	3.450	3.725	
26	0.684	1.315	1.706	2.056	2.479	2.779	3.067	3.435	3.707	
27	0.684	1.314	1.703	2.052	2.473	2.771	3.057	3.421	3.690	$\frac{120}{\nu}$
28	0.683	1.313	1.701	2.048	2.467	2.763	3.047	3.408	3.674	
29	0.683	1.311	1.699	2.045	2.462	2.756	3.038	3.396	3.659	
30	0.683	1.310	1.697	2.042	2.457	2.750	3.030	3.385	3.646	4
40	0.681	1.303	1.684	2.021	2.423	2.704	2.971	3.307	3.551	3
60	0.679	1.296	1.671	2.000	2.390	2.660	2.915	3.232	3.460	2
120	0.677	1.289	1.658	1.980	2.358	2.617	2.860	3.160	3.373	1
∞	0.674	1.282	1.645	1.960	2.326	2.576	2.807	3.090	3.291	0

The function tabulated is t_Q defined by

$$\int_{t_Q}^{\infty} f(t)dt = Q; \quad f(t) = \frac{(\frac{1}{2}\nu - \frac{1}{2})!}{\sqrt{(\nu\pi)(\frac{1}{2}\nu - 1)!}} \cdot \frac{1}{(1 + t^2/\nu)^{(\nu+1)/2}}$$

where $f(t)$ is the probability density of the t-distribution.
Interpolation ν-wise should be linear in $120/\nu$ for $\nu > 30$.
Use (i) upper row for one tail-tests
(i) lower row for two tail-tests
If x is a random variable with the t-probability distribution for ν degrees of freedom, the probability that $x > t_Q$ is Q and the probability that $|x| > t_Q$ is 2Q.

The graph shows the form of the distribution for $\nu = 2$. The shaded area represents the probability Q. For large ν the distribution approximates to the normal distribution N(0,1), shown by the dotted line.