THE PUBLIC ACCOUNTANTS EXAMINATIONS BOARD

A Committee of the Council of ICPAU

CPA (U) EXAMINATIONS

LEVEL ONE

QUANTITATIVE TECHNIQUES – PAPER 2

TUESDAY 28 MAY, 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 8 – 13.

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) Distinguish between:

(i) Systematic sampling and multi-stage sampling techniques. **(2 marks)**

(ii) Population mean and sample mean. **(2 marks)**

(b) To cross Burkina Faso border post, a tourist is required to present his/ her bank statements showing his/ her account balance (in US dollars). The following table shows the distribution of the account balances for a sample of 92 tourists in December 2018.

Account balance	No. of tourists
0 - 100	4
100 - 200	8
200 - 300	13
300 - 400	18
400 - 500	22
500 - 600	15
600 - 700	10
700 - 800	2

The Customs manager at the border would like to get this data further analysed for management use,

Required:

(i) Calculate Bowley's coefficient of skewness for the above data. **(9 marks)**

(ii) Construct a Lorenz curve representing the account balances of the tourists. **(7 marks)**

(Total 20 marks)

Question 2

(a) Akandi Drinks Ltd, a soft drinks company based in Kampala needs to appoint managers for each of their four substations in Jinja, Lira, Entebbe and Ishaka respectively. Four women and six men are available for appointment.

Required:

Determine the:

(i) possible number of appointments that can be made in order to have an equal number of men and women appointed.

(3 marks)

(ii) probability of appointing two other managers if one man and one woman were already in acting managerial positions and awaiting confirmation.

(3 marks)

(b) The data below shows the minutes by which 30 trainees at Kamwe Kamwe hardware were late in their 2 months of internship.

5	10	2	10	3	4
14	5	14	22	9	21
4	6	13	41	15	8
13	8	8	26	34	5
14	4	12	23	5	19

Required:

(i) Construct a frequency distribution table for the data above with classes of uniform class interval size starting from 0 - 9.

(2 marks)

(ii) Compute the unbiased estimate of the mean time. **(4 marks)**

(c) The mass of goats in Mbale and Arua is normally distributed with a standard deviation of 4 kg and 9 kg respectively. A random sample of 50 goats from Mbale had a mean mass of 30.3 kg while 40 goats from Arua had a mean mass of 30 kg.

Required:

(i) Test the hypothesis at 1% level that goats in the two districts are of equal mass.

(6 marks)

(ii) Comment on the result in (c) (i) above. **(2 marks)**

(Total 20 marks)

Question 3

(a) Distinguish between:

(i) Correlation and causation as used in correlation. **(2 marks)**

(ii) Simple linear regression and multiple linear regression. **(2 marks)**

(b) Smart Motors are testing the braking system of a new car model. The table below shows the braking distance Y (km) for different speeds X kmh^{-1}.

Speed (X)	30	40	50	60	70	80	90	100	120	135
Distance (Y)	30	43	48	65	75	82	95	100	120	140

Required:

(i) Use the least squares method to calculate the equation of the trend line in the form $Y = a + bX$.

(9 marks)

(ii) Use the equation of the trend above to estimate the braking distance of a car travelling at a speed of 55 kmh^{-1}.

(1 mark)

(c) The table below shows quantities and prices of different types of car tyres sold by an agent in the months of January and July 2018.

	January		July	
Type of tyre	Quantity	Price Shs '000'	Quantity	Price Shs '000'
Linglong	50	220	60	240
Dunlop	40	300	50	320
Bridgestone	30	400	25	450
Goodyear	20	350	20	380
Savero GT	60	250	50	x

Required:

Given that the Paasche's quantity index was calculated as 110; determine the price of Savero GT in July using January as the base period.

(6 marks)

(Total 20 marks)

Question 4

(a) Explain the term 'marginal cost'. **(2 marks)**

(b) JJ Metal Factory Ltd fabricates iron rods for sale. Their total daily revenue is given by the function $R(q) = (50 - 2q)(2q - 2)^2$; where q is the number of iron rods sold.

Required:

(i) Determine the number of sales that will maximise total revenue. **(11 marks)**

(ii) Calculate the maximum total daily revenue earned. **(2 marks)**

(c) Agnes and Jane went to Mutundwe market to buy rice and beans. Agnes paid a total of Shs 415,000 for 35 kg of rice and 61 kg of beans while Jane paid a total of Shs 347,500 for 28 kg of rice and 55 kg of beans.

Required:

Compute the unit price for each commodity. **(5 marks)**

(Total 20 marks)

Question 5

(a) Explain any **four** assumptions of linear programming. **(4 marks)**

(b) Opolot deals in secondhand cars of two types, Toyota Hiace TH and Nissan Caravan NC. He has Shs 800 million to invest in an inland car depot that accommodates 26 cars. TH costs Shs 40 million while NC costs Shs 25 million. The expected profit on TH is Shs 2 million while on a NC is Shs 1 million.

Required:

(i) Express the above information as a linear programming model. **(4 marks)**

(ii) Using the graphical method, determine the number of cars that Opolot should stock in order to maximise profits. **(6 marks)**

(c) The monthly expenditure on salaries and wages (in million shillings) of a science based University in Nansana in 2018 is as shown in the table below.

Month	Shs ,million'
January	355
February	380
March	420
April	400
May	410
June	450
July	430
August	440
September	480
October	460
November	500
December	540

Required:

(i) Calculate the three monthly moving averages of the expenditure. **(2 marks)**

(ii) Illustrate the expenditure and the moving averages graphically. **(3 marks)**

(iii) Comment on the trend. **(1 mark)**

(Total 20 marks)

Question 6

(a) Define the following terms in project network analysis.

(i) 'Float'. **(1 mark)**

(ii) 'Cost slope'. **(1 mark)**

(b) A local council has identified project activities, time and resources to develop the community .The project has the following time and resource data.

Activity	Preceding activity	Days	No. of men
K	-	2	3
X	K	3	2
Y	K	1	1
Z	-	6	2
W	X	2	3
M	Y,W	1	1

Required:

(i) Draw a Gantt chart for the project activities. **(7 marks)**

(ii) Determine the critical path of the project. **(3 marks)**

(c) Hakim Messi a fresh graduate has to make a choice between opening up a hardware shop and starting an agricultural mixed farm. There is a proposal to amend the tax laws for the two business ventures.

If the laws are maintained, the expected turnover from the hardware shop and the mixed farm is 9 million and 14.5 million respectively while if the laws are amended, the expected turnover for the hardware shop and mixed farm will be 6 million and 8 million respectively. Statistics from research indicate a 70% chance that the laws will be maintained.

Required:

(i) Construct a decision tree for the information above. **(3 marks)**

(ii) Using the expected monetary value criteria, advise Messi on which choice to make.

(5 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. 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 $= \dfrac{\sum (p_1 \times q_0)}{\sum (q_0 \times p_0)} \times 100$

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

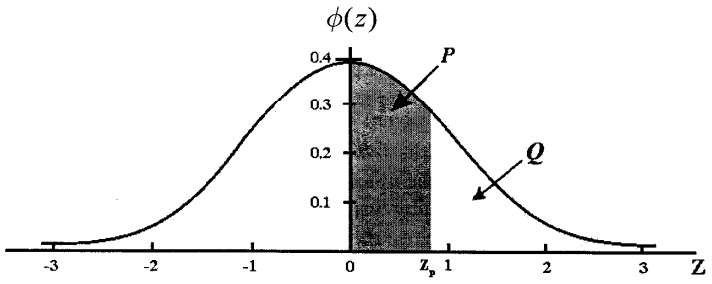
CUMULATIVE NORMAL DISTRIBUTION $P(z)$

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.