INSTITUTE OF CERTIFIED PUBLIC ACCOUNTANTS OF RWANDA
Driving Sustainable Performance

CERTIFIED PUBLIC ACCOUNTANT

FOUNDATION 1 EXAMINATION

F1.1: BUSINESS MATHEMATICS AND QUANTITATIVE METHODS

TUESDAY: 4 DECEMBER 2018

INSTRUCTIONS:

1. **Time Allowed: 3 hours 15 minutes** (15 minutes reading and 3 hours writing).
2. This examination has **seven** questions and only **five** questions are to be attempted.
3. Marks allocated to each question are shown at the end of the question.
4. Show all your workings, where applicable.

QUESTION ONE

(a) Distinguish between compound interest rate and effective interest rate. **(2 Marks)**

(b) Mutoni bought a house in Nyarugenge housing estate at RWF11, 520,737. She made a 35% down payment and applied for a simple interest amortized loan for the balance at 6% annually for 25 years. A home loan is approved if the total of all the borrower monthly payment is 30% of the borrower's monthly income.

REQUIRED:

Compute:

(i) Mutoni's monthly payments. **(8 marks)**

(ii) Her monthly income in order to qualify for the loan. **(2 marks)**

(c) Mugahinga Tour Company (MTC) took tourists on a trip from Gasabo to Nyaruguru which is 104km. On the return trip from Nyaruguru to Gasabo the average speed was reduced by 40 km/ hr due to road repairs taking 4 hours more than the normal time .MTC has a uniform charge of RWF 11,521 per hour on the road.

REQUIRED:

Compute the:

(i) Average speed on each trip. **(5 marks)**

(ii) Difference in expenditure for the two trips. **(3 marks)**

(Total 20 Marks)

QUESTION TWO

(a) Explain two major uses of a cumulative frequency curve. **(2 marks)**

(b) Because of Ebola outbreak in the region, Rwanda airport has stepped up its health checking. Passengers have to spend more time waiting to pass through screening points. At the airport, health officials each week select at random a sample of passengers. For each passenger selected the time spent at screening point is recorded on the cumulative frequency as follows.

Waiting Time (seconds)	Cumulative frequency
100 - 110	6
110 - 120	23
120 - 130	71
130 - 140	167
140 - 150	317
150 - 160	417
160 - 170	474
170 - 180	495
180 - 190	500

REQUIRED:

(i) Using the data in the cumulative frequency table construct a histogram. **(5 Marks)**

(ii) Use the histogram in (i) above to estimate the mode. **(2 Marks)**

(iii) Identify two general types of information that is provided by a histogram. **(2 marks)**

(c) Rugero, Gakwaya and Gasana are the leading stationery dealers in Nyarugenge district schools. Past records show that Rugero supplied 35% of reams of papers, Gakwaya supplied 45% of reams of papers and Gasana supplied 20% of the reams of papers. The probability that Rugero, Gakwaya and Gasana supplied a ream that is not full is $\frac{1}{50}$, $\frac{1}{25}$ and $\frac{1}{100}$ respectively. It transpired a school in Nyarugenge district purchased reams of paper and found them not full.

REQUIRED:

Find the probability that they were got from Rugero stationery dealers.

(9 Marks)
(Total 20 Marks)

QUESTION THREE

(a) Explain the following sampling methods.

(i) Convenience sampling. **(2 Marks)**

(ii) Quota sampling. **(2 Marks)**

(b) A health unit in Ngoma district took the body weight (x) of adults to be normally distributed with mean μ and standard deviation σ. A research on body weight was done on a random sample of 64 adults in the district and came up with the following finding, $\sum x$= 5,267.2 kg and $\sum x^2$ = 435,758.6.

REQUIRED:

Compute the:

(a) (i) Unbiased estimates of the mean and variance of weights of adults in Ngoma district. **(6 Marks)**

(ii) 98 % confidence interval for μ. **(4 Marks)**

(b) Four members of a Moto stage in Rubavu town made the saving in a month as in the table below.

Name	**Savings (RWF)**
Muteteli	230,415
Uwimana	207,373
Sentwali	172,811
Mukamutara	161,290

REQUIRED:

Compute the member's geometric mean savings. **(6 Marks)**

(Total 20 Marks)

QUESTION FOUR

(a) In a quality control experiment a sample of 500 pieces of timber from Butare Forest Company (BFC) were selected. Customarily 8% of the timber from BFC is of poor quality.

REQUIRED:

Determine the probability that more than 50 pieces of timber selected from BFC were of poor quality.

(8 Marks)

(b) Using examples distinguish between transport and assignment problem as cases of linear programming. **(4 Marks)**

(c) (i) In any assignment problem to assign jobs to workers in order to minimise time taken. Explain how you would eliminate an activity which has no worker who knows how to do it. **(1 Mark)**

(ii) Four workers (A, B, C and D) are assigned to do four jobs (i, ii, iii and iv). The cost of accomplishing each job in (RWF '000') is as shown in the table below:

		Worker			
		A	B	C	D
Job	(i)	8	10	17	9
	(ii)	3	8	5	6
	(iii)	10	12	13	9
	(iv)	6	13	9	7

REQUIRED:

Determine the assignment of workers to the corresponding jobs in order to get optimal cost.

(7 Marks)
(Total 20 Marks)

QUESTION FIVE

(a) Identify any two disadvantages of the Laspeyres price index. **(2 Marks)**

(b) In the district of Rulindo, cows are supposed to produce milk with a mean of 12 liters per day. Seven cows selected randomly gave a mean of 11.62 liters with a standard deviation of 0.38 liters. Assuming that the number of liters produced by the cow are normally distributed.

REQUIRED:

Test at 2% whether the production from the cow is different from the expected production.

(7 Marks)

(c) Rwamagana tailors group deals in making school uniforms, dresses and shorts. To make a dress requires 45 minutes cutting and 30 minutes of stitching. For a short requires 20 minutes of cutting and 40 minutes of stitching. For every 3 dresses produced at least 2 shorts are produced due to machine constraints. The profit on a dress is Fwr 930 and a short is Fwr 1150.The tailors work for 600 min per day.

REQUIRED:

Determine the:

(i) number of dresses and shorts to be produced to maximise profit using the graphical method.

(9 Marks)

(ii) the maximum profit. **(2 Marks)**

(Total 20 Marks)

QUESTION SIX

(a) The total revenue in "000" of Rwanda Francs earned by selling q hundred units of an item in Kigali in one day is described by the revenue function.
$R(q) = q^3(q-30)^2$.

REQUIRED:

Compute the marginal revenue function and hence determine the maximum value of R(q). **(5 Marks)**

(b) An investigation into the efficiency of 10 machines in a workshop and their age in operation was carried out by Rwanda standards agency. The following data obtained were recorded in the table below.

Machine label	1	2	3	4	5	6	7	8	9	10
Age (years)	2	5	12	6	8	1	1	3	7	4
Efficiency (%)	95	74	63	70	80	68	95	90	76	84

REQUIRED:

(i) Draw a scatter graph relating age and efficiency. **(3 Marks)**
(ii) Using the Pearson coefficient of correlation formula, calculate the coefficient of correlation between age and efficiency. **(7 Marks)**
(iii) Comment briefly on the results in parts (b) (ii). **(1 Mark)**

(c) (i) Define the term float as used in network analysis **(3 Marks)**
(ii) Distinguish between an activity on arch and activity on node. **(4 Marks)**

(Total 20 Marks)

QUESTION SEVEN

(a) Briefly explain maximin and maximax decision rules usually adopted in the context of decision making under conditions of uncertainty. **(1 Marks)**

(b) A firm sales a product quarterly for the past three year as indicated in the table below:

Year	Quarter	Sales
2015	1	600
	2	1,550
	3	1,500
	4	1,500
2016	5	2,400
	6	3,100
	7	2,600
	8	2,900
2017	9	3,800
	10	4,500
	11	4,000
	12	4,900

REQUIRED:

(i) Calculate a 4 centred moving total. **(2 Marks)**
(ii) Determine the trend values. **(3 Marks)**
(iii) Determine seasonal variations. **(2 Marks)**

The payoff matrix for two players Niyonsaba (P) and Ntibazirikana (Q) is as shown below.

$$A = \begin{pmatrix} Fwr\ 6000 & Fwr\ 8000 \\ Fwr\ 10000 & Fwr\ 5000 \end{pmatrix}$$

REQUIRED:

Compute the:
(i) Optimal Strategies to be followed by Niyonsaba (P) and Ntibazirikana (Q). **(6 Marks)**
(ii) Value of the game. **(3 Marks)**

(Total 20 Marks)

FORMULAE

1. Profit = Total Revenue – Total Cost

2. Spearman's Rank correlation coefficient $r = 1 - \frac{6\sum d^2}{n(n^2-1)}$

3. Harmonic mean (grouped data) $hm = \frac{n}{\sum \frac{f}{x}}$

4. Mean $\bar{x} = A + \frac{\sum fd}{\sum f}$ or Mean $\bar{x} = \frac{\sum fx}{\sum f}$

5. Geometric mean $GM = Anti\log \frac{1}{n}\sum \log_{10} x$

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

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

8. Co-efficient of variation $= \frac{S\tan arddeviation}{Mean} \times 100$

9. Standard deviation $\delta = \sqrt{\frac{\sum fx^2}{\sum f} - \bar{x}^2}$

10. 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 $a = \dfrac{\sum y}{n} - \dfrac{b\sum x}{n}$

11. Pearson coefficient of correlation r = $\dfrac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2} - (\sum x)^2 \times \sqrt{n\sum y^2 - (\sum y)^2}}$

12. Standardizing normal $z = \dfrac{\bar{x} - \mu}{\sigma}$

13. Confidence interval for a small sample $= \bar{x} \pm t_\alpha \dfrac{s}{\sqrt{n-1}}$

14. Confidence interval for a population $= \bar{x} \pm z_{\frac{\alpha}{2}} \dfrac{\delta}{\sqrt{n}}$

15. $\chi^2 = \sum \dfrac{(f_o - f_e)^2}{f_e}$, where f_o = observed value and f_e= expected value

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

17. Paasche's price index= $\dfrac{\sum (p_1 \times q_1)}{\sum (p_0 \times q_1)} \times 100$

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

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

20. $A = P(1 + r)^n$ where A is the compound loan amount at the end of the period, P is the Principle, r is the rate and n is the number of period.

21. $FV = P\frac{(1+r)^n - 1)}{r}$, where FV is the future value of an annuity, P is the period payment, r= rate of period and n is the number of period.

22 $\text{Speed} = \frac{dis\tan ce}{time}$

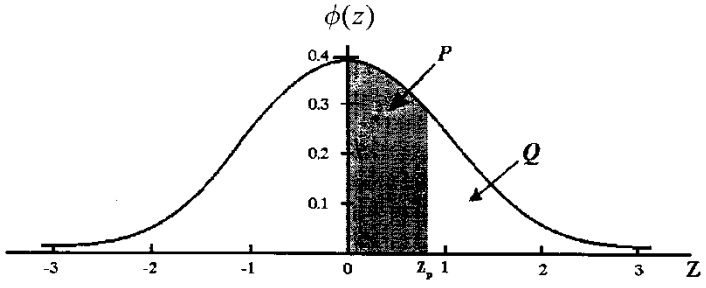
CUMULATIVE NORMAL DISTRIBUTION $P(z)$

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. $P(o < Z < z_p) = P$(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

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

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

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

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.