LCCI International Qualifications

L3

Pearson LCCI Level 3 Certificate in Business Statistics (VRQ)

(ASE20100)

SPECIFICATION

First teaching from January 2015

Issue 3

Edexcel, BTEC and LCCI qualifications

Edexcel, BTEC and LCCI qualifications are awarded by Pearson, the UK's largest awarding body offering academic and vocational qualifications that are globally recognised and benchmarked. For further information, please visit our qualification websites at www.edexcel.com, www.btec.co.uk or www.lcci.org.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus

About Pearson

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This specification is Issue 3. Key changes are listed in summary table on next page. We will inform centres of any changes to this issue. The latest issue can be found on the Pearson website: qualifications.pearson.com

Acknowledgements

This specification has been produced by Pearson on the basis of consultation with teachers, examiners, consultants and other interested parties. Pearson would like to thank all those who contributed their time and expertise to the specification's development.

References to third party material made in this specification are made in good faith. Pearson does not endorse, approve or accept responsibility for the content of materials, which may be subject to change, or any opinions expressed therein. (Material may include textbooks, journals, magazines and other publications and websites.)

All information in this specification is correct at time of publication.

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Summary of Pearson LCCI Certificate in Business Statistics (VRQ) specification Issue 3 changes

Summary of changes made between previous issue and this current issue	Page/section number
Definition of TQT added	15
TQT value added	15
Guided learning definition updated	15

Earlier issues show previous changes.

If you need further information on these changes or what they mean, contact us via our website at: qualifications.pearson.com/en/support/contact-us.html.

Introduction

LCCI qualifications

LCCI qualifications are widely regarded by employers as preparing students to carry out the key functions of modern international business. The qualifications are recognised worldwide by employers, universities and professional bodies such as the Association of Chartered Certified Accountants (ACCA) recognise them across the world.

This new and engaging range of qualifications has been developed in collaboration with professional bodies, employers and customers. We have conducted in-depth, independent consultation to ensure that the qualifications develop the breadth and depth of knowledge, skills and understanding that students need to be effective employees, and that the qualifications support progression pathways.

LCCI offers a wider range of qualifications; they are available at levels 1 to 4 across the following subject areas:

- English Language
- Marketing and Customer Service
- Business, Administration and IT
- Finance and Quantitative.

This specification is part of the Finance and Quantitative suite of LCCI qualifications.

Please refer to the website for details of other qualifications in the suite.

Purpose of the specification

This specification sets out:

- the objectives of the qualification
- any other qualification(s) that a student must have completed before taking the qualification
- any prior knowledge and skills that the student is required to have before taking the qualification
- any other requirements that a student must have satisfied before they will be assessed or before the qualification will be awarded
- the knowledge, understanding and skills that will be assessed as part of the qualification
- the method of assessment and any associated requirements relating to it
- the criteria against which a student's level of attainment will be measured (such as assessment criteria).

Rationale

The Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) meets the following purpose:

This qualification is for students who work in or want to work in business and research environments. This qualification is appropriate for students aiming for a career in business and finance where they will be sourcing and analysing business related data.

This Level 3 qualification will provide progression for students completing the Pearson LCCI Level 2 Certificate in Business Statistics.

A review of the qualification requirements at this level identified the main content areas. This qualification therefore includes content on basic concepts of statistical problem solving in real-life situations, statistical methods and concepts, probability, and an awareness of the potential and limitations of data and methods.

Qualification aim

The Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) qualification is for students who work in, or who want to work in, business and research environments. This qualification builds on knowledge and skills acquired from the Pearson LCCI Level 2 Certificate in Business Statistics (VRQ) qualification. Students will be aiming for a career in business and finance where they will be sourcing and analysing business related data. Students should have a level of English sufficient to evaluate and explain the appropriateness of methods and outcomes.

This qualification will enable students to apply statistical techniques to business data in order to plan and control business operations, evaluate and manage risk and support the decision-making process.

Students will gain an understanding of the basic concepts of statistical problem solving in business situations, develop knowledge, understanding and skills of statistical methods and concepts and in probability, including an awareness of the potential and limitations of data and methods.

Students will develop a critical perspective on statistics, including recognition of collection errors, misleading forms of presentation, improper analysis and invalid inferences and conclusions. Students will be encouraged to actively engage in the process of enquiry, communicate clearly using standard statistical conventions and notations and develop as effective and independent students.

The Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) qualification and legacy qualification are established and valued by employers worldwide and recognised by professional bodies. This qualification will enhance students statistical knowledge and abilities, a requirement of employers, enabling them to handle, understand, analyse, and interpret business data and question statistical method and models.

Together with other Pearson LCCI Level 3 business, accounting and finance qualifications, the Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) qualification allows progression to more advanced administrative, business and management qualifications and supports progression into the job market in areas such as forecasting, data collection and analysis, finance and accountancy.

This qualification will give students a suitable foundation for first year undergraduate programmes in business, finance and related fields.

It will give students an appreciation and understanding of data analysis, including its limitations, in a business and finance environment.

Contents

Specification at a glance

The Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) consists of one externally examined paper.

Title: Pearson LCCI Level 3 Certificate in Business Statistics (VRQ)	
• Externally assessed	100% of the total qualification

Overview of content

1 Management Information: The External and Internal Business Environment

- 1.1 Data collection
- 1.2 Descriptive statistics

2 Business Planning Models

- 2.1 Correlation and regression
- 2.2 Time based data

3 Risk Management and Business Decision Making

- 3.1 Probability, including the normal distribution
- 3.2 Estimation and confidence intervals
- 3.3 Significance testing
- 3.4 Chi-squared test

4 Quality Assurance and Control

- 4.1 Quality control

Overview of assessment

- One written externally set and marked paper, consisting of 100% of the overall grade of the qualification
- Assessment construction – examination consisting of five questions. The questions comprise short open response, calculations, chart/diagram construction/drawing and chart/diagram interpretation questions
- The examination will be 3 hours

Knowledge, skills and understanding

Content

The following content must be covered to prepare students for the final assessment of this qualification.

1. Management Information: The External and Internal Business Environment

Subject content	What students need to learn:
1.1 Data collection	a) Planning for data collection
	b) The difference between primary and secondary sources of business data
	c) The difference between a census and a survey and their relative advantages and disadvantages
	d) The need for a pilot survey before conducting a large scale survey
	e) The sample frame
	f) The determinants of sample size
	g) Alternative sampling methods: • random • systematic • multi stage • quota
	h) Advantages and disadvantages of the various sampling methods
	i) The role of stratification in sample design
	j) Advantages and disadvantages of the different methods of data collection including: • observation • telephone • interview • postal questionnaire • email survey • internet survey

Subject content	What students need to learn:
	k) Statistical bias
	l) Principles of questionnaire design
	m) Non-response and the methods of attempting to overcome this problem when dealing with business data
1.2 Descriptive statistics	a) Calculations: • the mode from either a histogram or by calculation • the median and quartiles from the cumulative frequency curve or by calculation • the mean and standard deviation for grouped data • coefficient of variation
	b) Diagrams, charts and graphs: • histogram, dealing with unequal class intervals • cumulative frequency curve
	c) Interpretation of the measures of location and dispersion including the coefficient of variation
	d) Skewness by calculation or graphically

2. Business Planning Models

Subject content	What students need to learn:
2.1 Correlation and regression	a) Response and explanatory variables
	b) Scatter diagram, interpreting the relationship shown on a scatter diagram including the possible presence of outliers
	c) Calculations • regression equation • the product moment correlation coefficient • Spearman's rank correlation coefficient
	d) Plot a least squares regression line
	e) Forecasting and forecast accuracy
	f) Testing for significance of the product moment correlation coefficient
	g) Meaning and interpretation of regression and correlation coefficients

Subject content	What students need to learn:
2.2 Time-based data	a) Components of a time series
	b) Calculations: • suitable moving average to identify the trend • the seasonal factors using either the additive or multiplicative model • weighted index number for price, quantity, cost and value • Laspeyres and Paasche index numbers including their advantages and disadvantages
	c) Diagrams, charts and graphs: • time series graph • the trend on the time series graph
	d) Choice of additive or multiplicative model
	e) Seasonally adjusted values and their uses
	f) Forecasting future values and their accuracy
	g) A national index of retail prices
	h) Change of base year and its effects
	i) Index linking for comparative purposes

3. Risk Management and Business Decision Making

Subject content	What students need to learn:
3.1 Probability, including the normal distribution	a) Uses of probability in the management of risk
	b) Probability concepts including mutually exclusive and independent events
	c) The addition and multiplication rules of probability
	d) Presentation of business outcomes including the use of tabulation and Venn and tree diagrams
	e) Problems involving conditional probability
	f) Applications of Bayes theorem
	g) Problems involving mathematical expectation
	h) Characteristics of normally distributed data
	i) Conversion of a general normal distribution to a standard normal distribution
	j) Use of normal distribution tables

Subject content	What students need to learn:
	k) Combinations of two or more independent normal distributions and including applications in a business context
3.2 Estimation and confidence intervals	a) Concept of a sampling distribution and a confidence interval
	b) Confidence interval for a mean using the normal distribution for large samples
	c) Confidence interval for a mean using the t distribution for small samples
	d) Confidence interval for a proportion
	e) Sample number required to obtain a confidence interval of a given size for a stated probability
3.3 Significance testing	a) Stages for carrying out statistical tests
	b) Use of a confidence interval in significance testing
	c) Type 1 and Type 2 errors and which of these might arise as a result of a significance test
	d) One tailed and two tailed test
	e) Choice of an appropriate test: • single mean test for large samples using the normal distribution • single mean test for small samples using the t distribution • single proportion test • two means test for large samples using the normal distribution • two means test for small samples using the t distribution • paired comparison test using the t distribution • two proportion test
3.4 Chi squared test	a) The appropriate use of a chi-squared test
	b) Chi-squared test for association using contingency tables
	c) Test for goodness of fit when percentages are given
	d) Differences between observed and expected values

4. Quality Assurance and Control

Subject content	What students need to learn:
4.1 Quality control	a) Advantages to management of setting up quality control charts
	b) The use of control charts for mean and range
	c) Diagrams, charts and graphs: • a mean chart using the normal distribution 0.025 point for the warning line and 0.001 point for the action line and interpreting the results • interpretation of results

The following skills should be developed throughout the course of study.

Skills	Students should:
	a) use and apply statistical techniques in a range of business contexts, including market research, financial data, manufacturing, business forecasting and economic indicators
	b) select and justify appropriate statistical methods and tests as an aid in solving business problems and business decisions
	c) collect, analyse and interpret results of diagrams, charts and graphs and information in the context of business situations.

Assessment

Assessment summary

Pearson LCCI Level 3 Certificate Business Statistics (VRQ)
First teaching: January 2015 First assessment: September 2015 Number of series: 4 Availability: April, June, September, November
Overview of content 1 Management Information: The External and Internal Business Environment: 1.1 Data collection 1.2 Descriptive statistics 2 Business Planning Models: 2.1 Correlation and regression 2.2 Time based data 3 Risk Management and Business Decision Making: 3.1 Probability, including the normal distribution 3.2 Estimation and confidence intervals 3.3 Significance testing 3.4 Chi squared test 4 Quality Assurance and Control: 4.1 Quality control

Pearson LCCI Level 3 Certificate Business Statistics (VRQ)

Overview of assessment

- One written externally set and marked paper, contributing 100% of the overall grade of the qualification
- The examination will be 3 hours
- The examination will consist of 100 marks
- Candidates will be graded Pass/Merit/Distinction. A result of Fail will be recorded where candidates do not achieve the required marks for a Pass
- The paper contains 5 questions
- Candidates answer all questions
- The questions comprise short open response, calculations, chart/diagram construction/drawing and chart/diagram interpretation questions
- Candidates are expected to have available a calculator with at least the following keys: +, −, ×, ÷, π, x^2, $\sqrt{x}$, $\frac{1}{x}$, x^y, $\ln x$, e^x, $x!$, sine, cosine and tangent and their inverses in degrees and decimals of a degree, and in radians; memory. Calculators with a facility for symbolic algebra, differentiation and/or integration are not permitted
- A formulae sheet will be provided

Assessment Objectives

Assessment objectives have been developed for this qualification to ensure that examinations are appropriately targeted. They describe the abilities that students should be able to demonstrate. Each question targets one or more assessment objectives. They are applied to the examination in the proportions below.

Students must:		% of qualification
AO1	Memorise Recall statistical procedures used in a business context; recall statistical terms and definitions; recall statistical processes and formulae	3
AO2	Perform procedures Select and use appropriate statistical techniques in a business context, carry out computations using standard statistical methods, present solutions in an appropriate format	61
AO3	Communicate understanding Interpret and explain statistical concepts and conclusions; present and summarise business data using suitable tables, charts /graphs and diagrams	30
AO4	Analyse Analyse data collected from primary and secondary sources; recognise patterns; make inferences; forecast outcomes; identify correlations/associations; distinguish different forms of statistical distributions (including their use) and interpret results to establish acceptance or otherwise of a given hypothesis.	6
	Total	100

Performance descriptors

Grade	Descriptor
Pass	Candidates can recall statistical procedures, terms, definitions, processes and formulae in a business context, showing an understanding of statistical concepts and conclusions. Candidates can select mostly appropriate statistical techniques and use them in a business context. They carry out computations with some accuracy using standard statistical methods, presenting solutions and data using tables, graphs, charts, diagrams with occasional errors. Candidates can analyse data from a range of sources, recognise significant patterns, make inferences and interpret the main issues in results. They draw on evidence to interpret results.
Distinction	Candidates can recall, and communicate thorough understanding of, statistical procedures, terms, definitions, processes and formulae in a business context and statistical concepts and conclusions. Candidates can consistently select appropriate statistical techniques and interpret outcomes accurately, applying these in a business context. They carry out computations with precision using statistical methods, presenting tables/graphs/charts/diagrams appropriately and accurately. Candidates can make reasoned judgements and substantiated interpretations, drawing on sophisticated analyses.

Performance descriptors may be revised following the first award.

Entry and assessment information

Please see the LCCI International Qualification Operations Guide for centres and the LCCI Examination Regulations, available from our website.

Student entry

Details on how to enter candidates for the examination for this qualification can be found at www.pearson.com.

The closing date for entries is approximately six weeks before the start of each examination series. Centres should refer to the published examination timetable for examination dates.

Combinations of entry

There are no forbidden combinations of entry for this qualification.

Age

Students must be a minimum of 16 years old to be entered onto this qualification.

Resitting the qualification

Candidates can resit the examination for Pearson LCCI Level 3 Certificate in Business Statistics (VRQ). Candidates can be entered for the next examination for this qualification.

Awarding and reporting

The Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) qualification is graded and certificated on a three-grade scale: Pass/Merit/Distinction. Pass and distinction are awarded, merit is arithmetically calculated.

Access arrangements, reasonable adjustments and special consideration

Access arrangements

Access arrangements are agreed before an assessment. They allow students with special educational needs, disabilities or temporary injuries to:

- access the assessment
- show what they know and can do without changing the demands of the assessment.

The intention behind an access arrangement is to meet the particular needs of an individual student with a disability without affecting the integrity of the assessment. Access arrangements are the principal way in which awarding bodies comply with the duty under the Equality Act 2010 to make 'reasonable adjustments'.

Access arrangements should always be processed at the start of the course. Students will then know what is available and have the access arrangement(s) in place for assessment.

Reasonable adjustments

The Equality Act 2010 requires an awarding organisation to make reasonable adjustments where a person with a disability would be at a substantial disadvantage in undertaking an assessment. The awarding organisation is required to take reasonable steps to overcome that disadvantage.

A reasonable adjustment for a particular person may be unique to that individual and therefore might not be in the list of available access arrangements.

Whether an adjustment will be considered reasonable will depend on a number of factors, which will include:

- the needs of the student with the disability
- the effectiveness of the adjustment
- the cost of the adjustment; and
- the likely impact of the adjustment on the student with the disability and other students.

An adjustment will not be approved if it involves unreasonable costs to the awarding organisation, timeframes or affects the security or integrity of the assessment. This is because the adjustment is not 'reasonable'.

Special consideration

Special consideration is a post-examination adjustment to a student's mark or grade to reflect temporary injury, illness or other indisposition at the time of the examination/assessment, which has had, or is reasonably likely to have had, a material effect on a candidate's ability to take an assessment or demonstrate his or her level of attainment in an assessment.

Further information

Please see our website or email internationalenquiries@pearson.com for further information about how to apply for access arrangements and special consideration.

For further information about access arrangements, reasonable adjustments and special consideration please refer to the JCQ website: www.jcq.org.uk.

Equality Act 2010 and Pearson equality policy

Equality and fairness are central to our work. Our equality policy requires all students to have equal opportunity to access our qualifications and assessments, and our qualifications to be awarded in a way that is fair to every student.

We are committed to making sure that:

- students with a protected characteristic (as defined by the Equality Act 2010) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to students who do not share that characteristic
- all students achieve the recognition they deserve for undertaking a qualification and that this achievement can be compared fairly to the achievement of their peers.

You can find details on how to make adjustments for students with protected characteristics in the policy document *Access Arrangements, Reasonable Adjustments and Special Considerations*, which is on our website, www.edexcel.com/Policies.

Malpractice

For up-to-date information on malpractice please refer to the latest Joint Council for Qualifications (JCQ) *Suspected Malpractice in Examinations and Assessments* document, available on the JCQ website: www.jcq.org.uk

Language of assessment

Assessment of this specification will be in English only. Assessment materials will be published in English only and all work submitted for examination must be in English only.

Other information

Total Qualification Time and Guided Learning Hours

For all regulated qualifications, we specify a total number of hours that learners are expected to undertake in order to complete and show achievement for the qualification – this is the Total Qualification Time (TQT). The TQT value indicates the size of a qualification.

Within the TQT, we identify the number of Guided Learning Hours (GLH) that a centre delivering the qualification needs to provide. Guided learning means activities that directly or immediately involve tutors and assessors in teaching, supervising, and invigilating learners, for example lectures, tutorials, online instruction and supervised study.

As well as guided learning, there may be other required learning that is directed by tutors or assessors. This includes, for example, private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

TQT and guided learning hours are assigned after consultation with users of the qualifications.

This qualification has a TQT value of 176 and a GLH of 135.

Student recruitment

Pearson follows the JCQ policy concerning recruitment to our qualifications in that:

- they must be available to anyone who is capable of reaching the required standard
- they must be free from barriers that restrict access and progression
- equal opportunities exist for all students.

Prior learning and other requirements

There are no formal entry requirements for this qualification.

Students may be studying in a local language but the assessment will be in English. Pearson recommends students have B1 level of English on the Common European Framework of Reference (CEFR). This will support access to the assessment materials and be able to communicate responses effectively.

Progression

Together with other Pearson LCCI Level 3 business, accounting and finance qualifications, the Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) will allow progression to more advanced administrative, business and management qualifications and supports progression into the job market in areas such as forecasting, data collection and analysis, finance and accountancy.

The Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) will give learners a suitable foundation for first-year undergraduate programmes in business, finance and related fields.

Exemptions

This qualification does not provide exemption to any other qualification in the suite or to qualifications with any other awarding organisation.

National Occupational Standards

The Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) has links to the following National Occupational Standards (NOS):

- XXX

Codes

This qualification is approved by Ofqual and meets the Ofqual General Conditions for inclusion on the Register of Regulated Qualifications. The Qualification Number (QN) is: xxxxxx

The subject code for Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) is: xxxx. The subject code is used by centres to enter students for a qualification. Centres will need to use the entry codes only when claiming students' qualifications.

Support, training and resources

Training

Pearson offers support and training to teachers on standard of delivery and preparing students to meet the assessment requirements.

Specifications, Sample Assessment Materials and Teacher Support Materials

The Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) Sample Assessment Materials document (ISBN 9781446912362) can be downloaded from our website.

To find a list of all the support documents available please visit the website.

Appendix

Appendix 1: Pearson LCCI Level 3 Certificate in Business Statistics (VRQ) – formulae sheet

Median for grouped data $l_{m+\frac{c_m}{f_m}\left(\frac{n}{2}-F_{m-1}\right)}$

Where l_m, c_m and f_m are the lower boundary, width and frequency respectively of the median class, n is the total number of observations and F_{m-1} is the cumulative frequency corresponding to l_m.

Mean for ungrouped data $\bar{x} = \frac{\sum x}{n}$

Mean for grouped data $\bar{x} = \frac{\sum fx}{\sum f}$

Standard deviation for ungrouped data $s = \sqrt{\frac{\sum x^2}{n} - \left(\bar{x}\right)^2}$

Standard deviation for grouped data $s = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$

Pearson measure of skewness $\frac{3\left(\bar{x} - \text{Median}\right)}{s}$

Coefficient of variation $\frac{s}{\bar{x}} \times 100$

Multiplication rule of probability $P(A \text{ I } B) = P(A) \times P(B)$ if A and B independent

Addition rule of probability $P(A \text{U} B) = P(A) + P(B) - P(A \text{U} B)$

	Price	Quantity
Laspeyres index	$\frac{\sum p_1 q_0}{\sum p_0 q_0} \times 100$	$\frac{\sum p_0 q_1}{\sum p_0 q_0} \times 100$
Paasche index	$\frac{\sum p_1 q_1}{\sum p_0 q_1} \times 100$	$\frac{\sum p_1 q_1}{\sum p_1 q_0} \times 100$
Weighted index	$\frac{\sum WI}{\sum W}$	

Product moment correlation coefficient $r = \dfrac{n\sum xy - \left(\sum x\right)\left(\sum y\right)}{\sqrt{\left(n\sum x^2 - \left(\sum x\right)^2\right)\left(n\sum y^2 - \left(\sum y\right)^2\right)}}$

Spearman's rank correlation coefficient $r_s = 1 - \dfrac{6\sum d^2}{n\left(n^2 - 1\right)}$

Least Squares regression line $\hat{y} = a + bx$

$$b = \frac{n\sum xy - \left(\sum x\right)\left(\sum y\right)}{n\sum x^2 - \left(\sum x\right)^2}$$

$$a = \frac{\sum y}{n} - \frac{b\sum x}{n}$$

One sample z test

Mean $z = \dfrac{\bar{x} - \mu}{\dfrac{\sigma}{\sqrt{n}}}$ Proportion $z = \dfrac{p - \pi}{\sqrt{\dfrac{\pi\left(1-\pi\right)}{n}}}$

Two sample z test

Mean $z = \dfrac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$ Proportion $z = \dfrac{p_1 - p_2}{\sqrt{p\left(1-p\right)\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}}$

where $p = \dfrac{n_1 p_1 + n_2 p_2}{n_1 + n_2}$

One sample t test

$t = \dfrac{\bar{x} - \mu}{\dfrac{s}{\sqrt{n}}}$ where $s = \sqrt{\dfrac{\sum\left(x - \bar{x}\right)^2}{n-1}}$

Independent samples t test

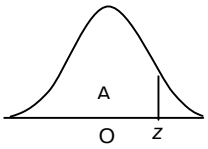
$t = \dfrac{\bar{x} - \bar{y}}{s\sqrt{\dfrac{1}{n} + \dfrac{1}{m}}}$ where $s = \sqrt{\dfrac{\sum\left(x - \bar{x}\right)^2 + \sum\left(y - \bar{y}\right)^2}{n + m - 2}}$

Chi Squared test $\chi^2 = \sum \dfrac{\left(O - E\right)^2}{E}$

Test for $p = 0$ $t = \dfrac{r\sqrt{n-2}}{\sqrt{1-r^2}}$

Table 1: The Normal Distribution

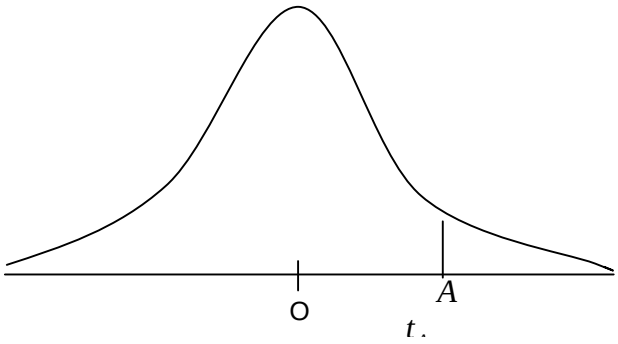
A is the area to the left of the given value of z



z	A	*z*	A	*z*	A	*z*	A	*z*	A
0.00	0.5000	0.50	0.6915	1.00	0.8413	1.50	0.9332	2.00	0.9772
0.01	0.5040	0.51	0.6950	1.01	0.8438	1.51	0.9345	2.02	0.9783
0.02	0.5080	0.52	0.6985	1.02	0.8461	1.52	0.9357	2.04	0.9793
0.03	0.5120	0.53	0.7019	1.03	0.8485	1.53	0.9370	2.06	0.9803
0.04	0.5160	0.54	0.7054	1.04	0.8508	1.54	0.9382	2.08	0.9812
0.05	0.5199	0.55	0.7088	1.05	0.8531	1.55	0.9394	2.10	0.9821
0.06	0.5239	0.56	0.7123	1.06	0.8554	1.56	0.9406	2.12	0.9830
0.07	0.5279	0.57	0.7157	1.07	0.8577	1.57	0.9418	2.14	0.9838
0.08	0.5319	0.58	0.7190	1.08	0.8599	1.58	0.9429	2.16	0.9846
0.09	0.5359	0.59	0.7224	1.09	0.8621	1.59	0.9441	2.18	0.9854
0.10	0.5398	0.60	0.7257	1.10	0.8643	1.60	0.9452	2.20	0.9861
0.11	0.5438	0.61	0.7291	1.11	0.8665	1.61	0.9463	2.22	0.9868
0.12	0.5478	0.62	0.7324	1.12	0.8686	1.62	0.9474	2.24	0.9875
0.13	0.5517	0.63	0.7357	1.13	0.8708	1.63	0.9484	2.26	0.9881
0.14	0.5557	0.64	0.7389	1.14	0.8729	1.64	0.9495	2.28	0.9887
0.15	0.5596	0.65	0.7422	1.15	0.8749	1.65	0.9505	2.30	0.9893
0.16	0.5636	0.66	0.7454	1.16	0.8770	1.66	0.9515	2.32	0.9898
0.17	0.5675	0.67	0.7486	1.17	0.8790	1.67	0.9525	2.34	0.9904
0.18	0.5714	0.68	0.7517	1.18	0.8810	1.68	0.9535	2.36	0.9909
0.19	0.5753	0.69	0.7549	1.19	0.8830	1.69	0.9545	2.38	0.9913
0.20	0.5793	0.70	0.7580	1.20	0.8849	1.70	0.9554	2.40	0.9918
0.21	0.5832	0.71	0.7611	1.21	0.8869	1.71	0.9564	2.42	0.9922
0.22	0.5871	0.72	0.7642	1.22	0.8888	1.72	0.9573	2.44	0.9927
0.23	0.5910	0.73	0.7673	1.23	0.8907	1.73	0.9582	2.46	0.9931
0.24	0.5948	0.74	0.7704	1.24	0.8925	1.74	0.9591	2.48	0.9934
0.25	0.5987	0.75	0.7734	1.25	0.8944	1.75	0.9599	2.50	0.9938
0.26	0.6026	0.76	0.7764	1.26	0.8962	1.76	0.9608	2.55	0.9946
0.27	0.6064	0.77	0.7794	1.27	0.8980	1.77	0.9616	2.60	0.9953
0.28	0.6103	0.78	0.7823	1.28	0.8997	1.78	0.9625	2.65	0.9960
0.29	0.6141	0.79	0.7852	1.29	0.9015	1.79	0.9633	2.70	0.9965
0.30	0.6179	0.80	0.7881	1.30	0.9032	1.80	0.9641	2.75	0.9970
0.31	0.6217	0.81	0.7910	1.31	0.9049	1.81	0.9649	2.80	0.9974
0.32	0.6255	0.82	0.7939	1.32	0.9066	1.82	0.9656	2.85	0.9978
0.33	0.6293	0.83	0.7967	1.33	0.9082	1.83	0.9664	2.90	0.9981
0.34	0.6331	0.84	0.7995	1.34	0.9099	1.84	0.9671	2.95	0.9984
0.35	0.6368	0.85	0.8023	1.35	0.9115	1.85	0.9678	3.00	0.9987
0.36	0.6406	0.86	0.8051	1.36	0.9131	1.86	0.9686	3.05	0.9989
0.37	0.6443	0.87	0.8078	1.37	0.9147	1.87	0.9693	3.10	0.9990
0.38	0.6480	0.88	0.8106	1.38	0.9162	1.88	0.9699	3.15	0.9992
0.39	0.6517	0.89	0.8133	1.39	0.9177	1.89	0.9706	3.20	0.9993
0.40	0.6554	0.90	0.8159	1.40	0.9192	1.90	0.9713	3.25	0.9994
0.41	0.6591	0.91	0.8186	1.41	0.9207	1.91	0.9719	3.30	0.9995
0.42	0.6628	0.92	0.8212	1.42	0.9222	1.92	0.9726	3.35	0.9996
0.43	0.6664	0.93	0.8238	1.43	0.9236	1.93	0.9732	3.40	0.9997
0.44	0.6700	0.94	0.8264	1.44	0.9251	1.94	0.9738	3.50	0.9998
0.45	0.6736	0.95	0.8289	1.45	0.9265	1.95	0.9744	3.60	0.9998
0.46	0.6772	0.96	0.8315	1.46	0.9279	1.96	0.9750	3.70	0.9999
0.47	0.6808	0.97	0.8340	1.47	0.9292	1.97	0.9756	3.80	0.9999
0.48	0.6844	0.98	0.8365	1.48	0.9306	1.98	0.9761	3.90	1.0000
0.49	0.6879	0.99	0.8389	1.49	0.9319	1.99	0.9767	4.00	1.0000
0.50	0.6915	1.00	0.8413	1.50	0.9332	2.00	0.9772		

Table 2: t Distribution

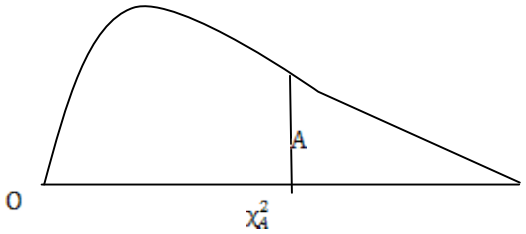
t_A is the value of the t statistic with ν degrees of freedom with area A to the right of it



ν	1	2	3	4	5	6	7	8
$t_{0.05}$	6.31	2.92	2.35	2.13	2.02	1.94	1.90	1.86
$t_{0.025}$	12.71	4.30	3.18	2.78	2.57	2.45	2.37	2.31
$t_{0.01}$	31.82	6.97	4.54	3.75	3.37	3.14	3.00	2.90
$t_{0.005}$	63.66	9.93	5.84	4.60	4.03	3.71	3.50	3.36
ν	9	10	11	12	13	14	15	16
$t_{0.05}$	1.83	1.81	1.80	1.78	1.77	1.76	1.75	1.75
$t_{0.025}$	2.26	2.23	2.20	2.18	2.16	2.15	2.13	2.12
$t_{0.01}$	2.82	2.76	2.72	2.68	2.65	2.62	2.60	2.58
$t_{0.005}$	3.25	3.17	3.11	3.05	3.01	2.98	2.95	2.92
ν	17	18	19	20	21	22	23	24
$t_{0.05}$	1.74	1.73	1.73	1.73	1.73	1.72	1.71	1.71
$t_{0.025}$	2.11	2.10	2.09	2.09	2.09	2.08	2.07	2.06
$t_{0.01}$	2.57	2.55	2.54	2.54	2.53	2.52	2.50	2.49
$t_{0.005}$	2.90	2.88	2.86	2.86	2.85	2.83	2.81	2.80

Table 3: Chi-Square Distribution Table

χ^2_A is the value of the χ^2 statistic with ν degrees of freedom with area A to the right of it



ν	1	2	3	4	5	6
$\chi^2_{0.05}$	3.84	5.99	7.81	9.49	11.07	12.59
$\chi^2_{0.01}$	6.63	9.21	11.34	13.28	15.09	16.81
ν	7	8	9	10	11	12
$\chi^2_{0.05}$	14.07	15.51	16.92	18.31	19.68	21.03
$\chi^2_{0.01}$	18.48	2.09	21.67	23.21	24.73	26.22

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