Pearson Edexcel

Pearson Edexcel Award in

Statistical Methods

Pearson Edexcel Level 1 Award in Statistical Methods (AST10)
Pearson Edexcel Level 2 Award in Statistical Methods (AST20)
Pearson Edexcel Level 3 Award in Statistical Methods (AST30)

For first teaching January 2013

Issue 3

Statistical Methods

Edexcel, BTEC and LCCI qualifications

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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

References to third-party material made in this specification are made in good faith. We do 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 the time of publication.

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Summary of Pearson Edexcel Awards in Statistical Methods specification Issue 3 changes

Summary of changes made between previous issue and this current issue	Page/section number
Appendices 5-9 have been removed as the mappings to old qualifications are no longer relevant.	n/a
ExamZone information has been deleted as this is no longer relevant.	23

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

The Pearson Edexcel Level 1, Level 2 and Level 3 Awards in Statistical Methods are designed for use in schools and colleges. They are part of a suite of mathematics qualifications offered by Pearson.

Qualification Objectives

The Pearson Edexcel Level 1, Level 2 and Level 3 Awards in Statistical Methods enable students to:

- develop an understanding of concepts in statistics and a sound foundation of statistical methods when:
  - calculating with data
  - displaying data
  - analysing data
  - interpreting statistical calculation and representations
  - using probability
- acquire confidence when using data to move into further study in the subject or related areas
- solve statistical problems
- enjoy using mathematics and become confident when using data
- develop a proficiency in statistics to support progression in their studies, in the workplace and in training.

These qualifications support progression to other level 1, level 2 and level 3 qualifications, such as GCSE and GCE. The awards give statistical proficiency to support study in other subjects such as business, economics, biology and geography.

Contents

Specification at a glance

- These Level 1, Level 2 and Level 3 Awards qualifications consist of a single assessment at each level.
- Students are entered at either level 1, level 2 or level 3.
- Each Award is either pass or unclassified.

Level 1	**Paper code: AST10**
• Externally assessed. • Availability: January and June series. • First assessment: June 2013.	**100% of the Award**
Overview of content • Collecting and displaying data. • Calculating and interpreting data. • Probability.	
Overview of assessment • The award is assessed through a 1 hour and 30 minutes examination set and marked by Pearson. • The total number of marks for the paper is 80. • The qualification is awarded at pass or unclassified.	

Level 2	**Paper code: AST20**
• Externally assessed. • Availability: January and June series. • First assessment: June 2013.	**100% of the Award**
Overview of content • Collecting and displaying data. • Calculating and interpreting data. • Probability.	
Overview of assessment • The award is assessed through a 1 hour and 30 minutes examination set and marked by Pearson. • The total number of marks for the paper is 80. • The qualification is awarded at pass or unclassified.	

Level 3	Paper code: AST30
• Externally assessed. • Availability: January and June series. • First assessment: June 2013.	**100% of the Award**
Overview of content • Collecting and displaying data. • Calculating and interpreting data. • Probability.	
Overview of assessment • The award is assessed through a 2 hour examination set and marked by Pearson. • The total number of marks for the paper is 90. • The qualification is awarded at pass or unclassified.	

External assessment

In all examination papers:

- diagrams will not necessarily be drawn to scale and measurements should not be taken from diagrams unless instructions to this effect are given
- each student may be required to use mathematical instruments, eg ruler and protractor
- calculators may be used.

Calculators

Students will be expected to have access to a suitable electronic calculator. Details are given below. Students will be expected to know how to use estimation to evaluate approximations to numerical calculations and to show the appropriate stages of their working out.

The electronic calculator to be used by students attempting the level 1 examination paper should have these functions as a minimum:

- +, −, ×, ÷, memory, brackets.

The electronic calculator to be used by students attempting the level 2 examination paper should have these functions as a minimum:

- +, −, ×, ÷, x^2, $\sqrt{x}$, memory, brackets

The electronic calculator to be used by students attempting the level 3 examination paper should have these functions as a minimum:

- +, −, ×, ÷, x^2, $\sqrt{x}$, memory, x^y, $x^{1/y}$, brackets, statistical and reciprocal functions

Calculators with any of the following facilities are prohibited in all examinations:

- databanks; retrieval of text or formulae; QWERTY keyboards; built-in symbolic algebra manipulations; symbolic differentiation or integration.

Qualification content

Knowledge, skills and understanding

The Pearson Edexcel Level 1, Level 2 and Level 3 Awards in Statistical Methods require students to demonstrate competency in statistical methods, concepts and techniques.

Level 1, Level 2 and Level 3 content contains:

1. **Data**
2. **Displaying data**
3. **Calculating with data**
4. **Interpreting data**
5. **Probability**

Assessment overview

- One written paper taken at the end of the course.
- The Level 1 Award:
  - is assessed through a 1 hour and 30 minutes examination set and marked by Pearson Edexcel
  - Total number of marks for the paper is 80.
- The Level 2 Award:
  - is assessed through a 1 hour and 30 minutes examination set and marked by Pearson
  - Total number of marks for the paper is 80.
- The Level 3 Award:
  - is assessed through a 2 hour examination set and marked by Pearson
  - Total number of marks for the paper is 90.
- Each Award is pass or unclassified.
- Available in January and June.
- First assessment: June 2013.

Pearson Edexcel Level 1 Award in Statistical Methods

Overview

Content overview

This qualification contains:

1. **Data**
2. **Displaying data**
3. **Calculating with data**
4. **Interpreting data**
5. **Probability**

Level 1

What students need to learn:

Topic		Concepts and skills
1.	**Data**	1. Understand and use discrete, continuous and categorical data 2. Design and use simple data collection sheets for discrete and continuous data, using tallies including grouped frequencies 3. Criticise a question for a questionnaire 4. Understand reliability (including the significance of the number of trials)
2.	**Displaying data**	1. Draw pictograms, bar charts, line graphs, dual bar charts, two-way tables, pie charts, simple time-series graphs and scatter graphs 2. Identify simple misuse of visual representations
3.	**Calculating with data**	1. Find totals, mean, mode, median and range for lists of data 2. Find range and mode from a stem and leaf diagram
4.	**Interpreting data**	1. Read and interpret data presented in tables 2. Interpret pictograms, bar charts, line graphs, dual bar charts, two-way tables, pie charts, simple time-series graphs, and scatter graphs 3. Find totals and modes from frequency tables or diagrams 4. Describe correlation in scatter graphs 5. Identify trend in time-series graphs 6. Compare data using frequencies, totals, mean, median, mode and range 7. Make comparisons and predictions from data and representations of data

Topic	Concepts and skills
5. Probability	1. Use and interpret a probability scale 2. Write down theoretical/experimental probabilities ($\frac{1}{n}$ and $\frac{a}{n}$) 3. Estimate probabilities from practical situations 4. Add two probabilities (including $1-p$) 5. List outcomes in theoretical and practical situations

Pearson Edexcel Level 2 Award in Statistical Methods

Overview

Content overview

This qualification contains:

1. **Data**
2. **Displaying data**
3. **Calculating with data**
4. **Interpreting data**
5. **Probability**

All level 1 content is assumed knowledge and can be tested at level 2.

Level 2

What students need to learn:

All level 1 content is assumed knowledge and can be tested at level 2.

Topic		Concepts and skills
1.	**Data**	1 Classify discrete, continuous and categorical data 2 Recognise the difference between a sample and a population and give a simple reason for sampling 3 Design a question for a questionnaire 4 Identify possible sources of bias in sampling methods 5 Calculate a stratified sample using one category
2.	**Displaying data**	1. Draw composite bar charts, two-way tables and time-series graphs with or without moving averages, ordered and unordered stem and leaf diagrams, complete grouped frequency tables, frequency polygons, cumulative frequency diagrams, box plots, histograms (equal class interval) and sample space diagrams 2. Identify misuse of visual representations
3.	**Calculating with data**	1. Calculate means for grouped and ungrouped data 2. Find the median, quartiles and interquartile ranges for grouped and ungrouped data 3. Calculate moving averages, combined means and fixed base index numbers 4. Calculate means and standard deviation 5. Understand and use summation notation in statistical calculations

Topic		Concepts and skills
4.	**Interpreting data**	1. Interpret and compare composite bar charts, frequency polygons, scatter diagrams, cumulative frequency diagrams and box plots, histograms with equal class intervals, and sample space diagrams. 2. Find the modal class interval from a frequency table or diagram 3. Find the class interval which contains the median 4. Identify outliers 5. Draw lines of best fit on scatter graphs and trend lines by eye with or without mean point 6. Identify and describe skew 7. Compare data using interquartile range, skew and standard deviation 8. Make comparisons and predictions from data and representations of data and describe trend 9. Interpret and compare moving averages and fixed base index numbers
5.	**Probability**	1. Compare theoretical and experimental probabilities 2. Add two or more probabilities (including $1-p$) 3. Use sample space diagrams to calculate probabilities 4. Use probability to estimate outcomes 5. Multiply probabilities using tree diagrams

Pearson Edexcel Level 3 Award in Statistical Methods

Overview

Content overview

This qualification contains:

1. **Data**
2. **Displaying data**
3. **Calculating with data**
4. **Interpreting data**
5. **Probability**

All level 2 content is assumed knowledge and can be tested at level 3.

Level 3

What students need to learn:

All level 2 content is assumed knowledge and can be tested at level 3.

Topic		Concepts and skills
1.	**Data**	1. Understand and explain census, population, sampling frame, discrete, continuous, categorical, qualitative, quantitative, primary and secondary data 2. Calculate a stratified sample using two categories 3. Use Peterson's capture and recapture method to estimate the size of populations
2.	**Displaying data**	1. Draw back-to-back stem and leaf diagrams, box plots (with outliers) and generated from cumulative frequency graphs, histograms (unequal class intervals), sketch normal distributions and Venn diagrams
3.	**Calculating with data**	1. Calculate geometric means, mean seasonal variation and moving base index numbers 2. Calculate means and standard deviations for grouped and ungrouped data, including using summation notation 3. Use LQ – 1.5 × IQR and UQ + 1.5 × IQR to identify outliers 4. Calculate measures of correlation including Spearman's coefficient of rank correlation and Product-moment correlation coefficient (PMCC) 5. Calculate variances S_{xx}, S_{yy} and S_{xy} from given information [NB Questions will state the expected formulae used to calculate variance: typically $S_{xx} = \sum x^2 - \frac{1}{n}(\sum x)^2$ or equivalent 6. Calculate standardised scores

Topic		Concepts and skills
4.	**Interpreting data**	1. Compare histograms and normal distributions 2. Identify and describe correlation in scatter graphs and interpret measures of correlation 3. Identify trend and seasonality in time-series graphs (including moving averages) 4. Interpret and compare data using frequencies, totals, mean/median/mode/range, interquartile range, skew and standard deviation and standardised scores 5. Interpret and compare geometric means and chain base index numbers 6. Interpret back to back stem and leaf diagrams, box plots with outliers, venn diagrams, and data from a variety of representations to solve a problem
5.	**Probability**	1. Use probability and relative frequency to estimate outcomes or make predictions 2. Use sample space and Venn diagrams to calculate probabilities 3. Multiply and add probabilities using tree diagrams 4. Understand mutually exclusive and independent events, that $\mathrm{P}(A \text{ or } B) = \mathrm{P}(A) + \mathrm{P}(B)$ 5. Use $\mathrm{P}(A \text{ and } B) = \mathrm{P}(A) \times \mathrm{P}(B)$ for independent events A and B $\mathrm{P}(A \text{ or } B) = \mathrm{P}(A \cup B)$ $= \mathrm{P}(A) + \mathrm{P}(B) - \mathrm{P}(A \cap B)$ 6. Find conditional probabilities and use $\mathrm{P}(A \mid B) = \frac{P(A \cap B)}{P(B)}$ 7. Identify and calculate binomial probabilities 8. Find probabilities using standard normal distribution tables

Assessment

Assessment summary

Level 1 **Paper code: AST10**
• One written examination paper. • The paper is assessed through a 1 hour and 30 minute examination, set and marked by Pearson. • The total number of marks for the paper is 80. • The qualification is awarded at pass or unclassified.

Level 2 **Paper code: AST20**
• One written examination paper. • The paper is assessed through a 1 hour and 30 minute examination, set and marked by Pearson. • The total number of marks for the paper is 80. • The qualification is awarded pass or unclassified.

Level 3 **Paper code: AST30**
• One written examination paper. • The paper is assessed through a 2 hour examination, set and marked by Pearson. • The total number of marks for the paper is 90. • The qualification is awarded pass or unclassified.

Assessment Objectives and weightings

Level 1

		% in Award
AO1:	Demonstrate knowledge, understanding and skills in collecting and representing data	25%–35%
AO2:	Demonstrate understanding, knowledge, and skills in performing statistical calculations	15%–25%
AO3:	Demonstrate understanding, knowledge, and skills in interpreting and discussing data	20%–30%
AO4:	Demonstrate understanding, knowledge, and skills in probability	20%–30%
	TOTAL	100%

Level 2

		% in Award
AO1:	Demonstrate knowledge, understanding and skills in collecting and representing data	25%-35%
AO2:	Demonstrate understanding, knowledge, and skills in performing statistical calculations	25%-35%
AO3:	Demonstrate understanding, knowledge, and skills in interpreting and discussing data	15%–25%
AO4:	Demonstrate understanding, knowledge, and skills in probability	15%–25%
	TOTAL	100%

Level 3

		% in Award
AO1:	Demonstrate knowledge, understanding and skills in collecting and representing data	20%–30%
AO2:	Demonstrate understanding, knowledge, and skills in performing statistical calculations	25%–35%
AO3:	Demonstrate understanding, knowledge, and skills in interpreting and discussing data	10%–20%
AO4:	Demonstrate understanding, knowledge, and skills in probability	25%–35%
	TOTAL	100%

Relationship of assessment objectives to papers

Paper number	Assessment objective				
	AO1	AO2	AO3	AO4	Total for AO1, AO2 and AO3 and AO4
Level 1	25–35%	15—25%	20–30%	20-30%	100%
Level 2	25–35%	25–35%	15-25%	15-25%	100%
Level 3	20–30%	25-35%	10–20%	25-35%	100%

Entering your students for assessment

Student entry

Students are entered at either level 1, level 2 or level 3.

Details of how to enter students for this qualification can be found in Pearson's *Information Manual*, copies of which (in CD format) are sent to all active Pearson centres. The information can also be found on Pearson's website: qualifications.pearson.com

Access arrangements and special considerations

Pearson's policy on access arrangements and special considerations for GCE, GCSE, International GCSE, and Entry Level qualifications aims to enhance access to the qualifications for students with disabilities and other difficulties without compromising the assessment of skills, knowledge, understanding or competence.

The access arrangements and special arrangements for these qualifications will comply with this policy.

Please see the Pearson website (qualifications.pearson.com/sfc) for:

- the Joint Council for Qualifications (JCQ) policy Access Arrangements, Reasonable Adjustments and Special Considerations 2010-2011
- the forms to submit for requests for access arrangements and special considerations
- dates for submission of the forms.

Requests for access arrangements and special considerations must be addressed to:

Special Requirements
Pearson
One90 High Holborn
London WC1V 7BH

Assessing your students

The first assessment opportunity for these qualifications will take place in the June 2013 series and in each January and June series thereafter for the lifetime of the qualifications.

Your students' assessment opportunities

All papers	June 2013	January 2014	June 2014	January 2015
Level 1, Level 2 and Level 3	✓	✓	✓	✓

Awarding and reporting

The awarding and certification processes for these qualifications will comply with the current GCSE/GCE Code of Practice, which is published by the Office of Qualifications and Examinations Regulation (Ofqual). The Level 1, Level 2 and Level 3 Awards qualifications will be pass only.

The first certification opportunity for the Pearson Edexcel Level 1, Level 2 and Level 3 Awards in Statistical Methods will be June 2013.

Students whose level of achievement is below the minimum judged by Pearson to be of sufficient standard to be recorded on a certificate will receive an unclassified (U) result.

Language of assessment

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

Malpractice and plagiarism

For up-to-date advice on malpractice and plagiarism, please refer to the JCQ's *Suspected Malpractice in Examinations: Policies and Procedures* document on the JCQ website: www.jcq.org.uk.

Student recruitment

Pearson's access policy concerning recruitment to our qualifications is 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

For Level 1 and Level 2, these qualifications build on the content, knowledge and skills developed in the Key Stage 3 Programme of Study for Mathematics as defined by the National Curriculum Orders for England.

For Level 3, this qualification builds on the content, knowledge and skills taught as part of GCSE mathematics.

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 80 and a GLH of 60.

Progression

At Level 1 and Level 2, these qualifications support progression to:

- GCSE in Mathematics
- GCSE in Statistics
- further level 2 qualifications in numerate disciplines, such as the sciences and geography
- further education or employment where statistical skills are required.

At Level 3, this qualification supports progression to:

- GCE AS and A Level Mathematics
- further level 3 qualifications in numerate disciplines, such as psychology and geography.
- further education or employment where statistical skills are required.

Level descriptors

The following level descriptors indicate the level of attainment characteristic of the given level. They give a general indication of the required learning outcomes at each specified level. The descriptors should be interpreted in relation to the content outlined in the specification; they are not designed to define that content. The level awarded will depend in practice upon the extent to which the candidate has met the Assessment Objectives overall. Shortcomings in some aspects of the examination may be balanced by better performance in others.

Level 1

Candidates understand and use the mean of discrete data. They choose suitable methods to represent data. They compare two simple distributions using the range and one of the mode, median or mean. They interpret graphs and diagrams, including pie charts, and draw conclusions. They understand and use the probability scale from 0 to 1. Candidates make and justify estimates of probability by selecting and using a method based on equally likely outcomes or on experimental evidence as appropriate. They understand that different outcomes may result from repeating an experiment.

Level 2

Candidates understand sampling and design questions for questionnaires. They construct and interpret frequency diagrams. They determine the modal class and estimate the mean, median of a set of grouped data, selecting the statistic most appropriate to a line of enquiry. They use measures of average and range with associated frequency polygons, as appropriate, to compare distributions and make inferences. They use and understand moving averages, cumulative frequency, stem and leaf diagrams, index numbers, probability tree diagrams and sample space diagrams. Candidates understand relative frequency as an estimate of probability and use this to compare outcomes of experiments.

Level 3

Candidates are increasingly sophisticated in their handling of data. They use stratified sampling, histograms with unequal class intervals, back-to-back stem and leaf diagrams, outliers, seasonal variation and chain base index numbers. They calculate standard deviation, geometric means, Spearman's coefficient of rank correlation and product moment correlation coefficient. They use Venn Diagrams and the Normal distribution.

Candidates interpret and construct histograms. They recognise when and how to work with probabilities associated with independent and mutually exclusive events and they find conditional probabilities.

Support and training

Pearson support services

Pearson has a wide range of support services to help you implement this qualification successfully.

ResultsPlus – ResultsPlus is an application launched by Pearson to help subject teachers, senior management teams, and students by providing detailed analysis of examination performance. Reports that compare performance between subjects, classes, your centre and similar centres can be generated in 'one-click'. Skills maps that show performance according to the specification topic being tested are available for some subjects. For further information about which subjects will be analysed through ResultsPlus, and for information on how to access and use the service, please visit qualifications.pearson.com/resultsplus.

Ask the Expert – To make it easier for you to raise a query with us online, we have merged our **Ask Edexcel** and **Ask the Expert** services.

There is now one easy-to-use web query form that will allow you to ask any question about the delivery or teaching of Pearson qualifications. You'll get a personal response, from one of our administrative or teaching experts, sent to the email address you provide.

We'll also be doing lots of work to improve the quantity and quality of information in our FAQ database, so you'll be able find answers to many questions you might have by searching before you submit the question to us.

Training

A programme of professional development and training courses, covering various aspects of the specification and examination, will be arranged by Pearson. Full details can be obtained from our website: qualifications.pearson.com

Appendices

Appendix 1: Calculators

The range of functions on calculators is increasing all the time. Current models can be used to answer questions on a number of topics, including fractions. It would clearly be unfair if sophisticated calculators gave candidates an advantage in the examination.

In addition to ensuring fairness to candidates, another of our aims as examiners is to encourage good classroom practice. Appropriate and efficient use of calculators is desirable but reliance on them at the expense of understanding and learning mathematical techniques is not.

Appendix 2: Wider curriculum

Signposting and development suggestions

Issue	Paper	Opportunities for development
Spiritual	All papers	These qualifications will enable centres to provide courses in mathematics that will allow students to discriminate between truth and falsehood. As students explore mathematical models of the real world there will be many naturally arising moral and cultural issues, environmental and health and safety considerations and aspects of European developments for discussion, for example: • use and abuse of statistics in the media • financial and business mathematics • how mathematics is used to communicate climate change • cultural and historical roots of mathematics • use of mathematics in cultural symbols and patterns.
Moral	All papers	
Ethical	All papers	
Social	All papers	
Legislative	All papers	
Economic	All papers	
Cultural	All papers	
Sustainable	All papers	
Health and safety	All papers	
European initiatives	All papers	

Appendix 3: Codes

Type of code	Use of code	Code number
Qualification codes	Each qualification title is allocated a qualification code. The qualification framework code is known as a Qualification Number (QN). This is the code that features in the DfE Funding Schedule, Section 96, and is to be used for all qualification funding purposes. The QN is the number that will appear on the student's final certification documentation.	The QNs for the qualifications in this publication are: Level 1: 600/7262/3 Level 2: 600/7264/7 Level 3: 600/7266/0
Cash-in codes	The cash-in code is used as an entry code to aggregate the student's scores to obtain the overall grade for the qualification. Centres will need to use the entry codes only when entering students for their qualification.	Level 1: AST10 Level 2: AST20 Level 3: AST30
Entry codes	The entry codes are used to: • enter a student for assessment • aggregate the student's paper scores to obtain the overall grade for the qualification.	Please refer to the *Information Manual*, available on the Pearson website.

Appendix 4: Normal Distribution Tables

These tables are included in the paper for the Level 3 Award in Statistical Methods.

THE NORMAL DISTRIBUTION FUNCTION

The function tabulated below is $\Phi(z)$, defined as $\Phi(z) = \frac{1}{\sqrt{2\pi}}\int_{-\infty}^{z} e^{-\frac{1}{2}t^2}\ \mathrm{d}t$.

z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$
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

z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$	z	$\Phi(z)$
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		

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