Core Programming

Core Programming: Reference-1

	Programming in C – A Complete Introduction to the C Programming Language
	Introduction and Some Fundamentals
01	Programming
02	Higher-Level Languages
03	Integrated Development Environments
04	Operating System
05	Compiling Programs
06	Integrated Development Environment
07	Language Interpreters
	Compiling and Running Your First Program
08	Compiling Your Program
09	Running Your Program
10	Understanding Your First Program
11	Displaying the Values of Variables
12	Comments
	Exercises
	Variables, Data Types, and Arithmetic Expressions
13	Working with Variables
19	Understanding Data Types and Constants – Topics 6
22	Working with Arithmetic Expression – Topics 3
23	The Assignment Operators
24	Types _Complex and _Imaginary
	Program Looping
29	The (for) Statement – Topics 5
30	The (While) Statement
32	The (do) Statement – Topics 2
	Making Decisions
36	The (if) Statement – Topics 4
37	The (switch) Statement
38	Boolean Variables
39	The Conditional Operators
	Exercises
	Working with Arrays
42	Defining an Array – Topics 3
43	Initializing Arrays
45	Character Arrays – Topics 2
46	Multidimensional Arrays
47	Variable-Length Arrays
	Exercises
	Working with Functions
48	Defining a Function
50	Arguments and Local Variables – Topics 2
51	Returning Function Results
53	Functions Calling Functions Calling – Topics 2
54	Top-Down Programming
57	Functions and Arrays – Topics 3
58	Global Variables
59	Automatic and Static Variables
60	Recursive Functions

Core Programming: Reference-2

	Object Oriented Programming with C++
	Principles of Object-Oriented Programming
01	Software Crisis
02	Software Evolution
03	A Look at Procedure-Oriented Program
04	Object-Oriented Programming Paradigm
05	Concepts of Object-Oriented Programming
06	Benefits of OOP
07	Object-Oriented Languages
08	Applications of OOP
	Beginning with C++
09	What is C++
10	Applications of C++
11	A Simple C++ Program
12	More C++ Statements
13	An Example with Class
14	Structure of C++ Program
15	Creating the Source File
16	Compiling and Linking
	Tokens, Expression and Control Structures
17	Introduction
18	Tokens
19	Keywords
20	Identifiers and Constants
21	Basic Data Types
22	User-Defined Data Types
23	Storage Classes
24	Derived Data Types
25	Symbolic Constants
26	Type Compatibility
27	Declaration of Variables
28	Dynamic Initialization of Variables
29	Reference Variables
30	Operators in C++
31	Scope Resolution Operator
32	Member Dereferencing Operators
33	Memory Management Operators
34	Manipulators
35	Type Cast Operator
36	Expressions and Their Types
37	Special Assignment Expressions
38	Implicit Conversions
39	Operator Overloading
40	Operator Precedence
41	Control Structures
	Functions in C++
42	Introduction
43	The Main Function
44	Function Prototyping
45	Call by Reference | Return by Reference
46	Inline Functions
47	Default Arguments

48	Const Arguments
49	Recursion
50	Function Overloading
51	Friend and Virtual Functions
52	Math Library Functions
	Classes and Objects
53	Introduction
54	C Structures Revisited
55	Specifying a Class 92
54	Defining Member Functions
55	A C++ Program with Class
56	Making an Outside Function Inline
57	Nesting of Member Functions
58	Private Member Functions
59	Arrays within a Class
60	Memory Allocation for Objects
61	Static Data Members
62	Static Member Functions
63	Arrays of Objects
64	Objects as Function Arguments
65	Friendly Functions
66	Returning Objects
67	(const) Member Functions
68	Pointers to Members
69	Local Classes
	Constructors and Destructors
70	Introduction
71	Constructors
72	Parameterized Constructors
73	Multiple Constructors in a Class
74	Constructors with Default Arguments
75	Dynamic Initialization of Objects
76	Copy Constructor
77	Dynamic Constructors
78	Constructing Two-Dimensional Arrays
79	(const) Objects
80	Destructors
	Operator Overloading and Type Conversions
81	Introduction
82	Defining Operator Overloading
83	Overloading Unary Operators
84	Overloading Binary Operators
85	Overloading Binary Operators Using Friends
86	Manipulation of Strings Using Operators
87	Some Other Operator Overloading Examples
88	Rules for Overloading Operators
89	Type Conversions
	Inheritance: Extending Classes
90	Introduction
91	Defining Derived Classes
92	Single Inheritance
93	Making a Private Member Inheritable
94	Multilevel Inheritance
95	Multiple Inheritance
96	Hierarchical Inheritance

97	Hybrid Inheritance
98	Virtual Base Classes
99	Abstract Classes
100	Constructors in Derived Classes
101	Member Classes: Nesting of Classes
	Pointers, Virtual Functions and Polymorphism
102	Introduction
103	Pointers
104	Pointers to Objects
105	(this) Pointer
106	Pointers to Derived Classes
107	Virtual Functions
108	Pure Virtual Functions
109	Virtual Constructors and Destructors
	Managing Console I/O Operations
110	Introduction
111	C++ Streams
112	C++ Stream Classes
113	Unformatted I/O Operations
114	Formatted Console I/O Operations
115	Managing Output with Manipulators
	Working with Files
116	Introduction
117	Classes for File Stream Operations
118	Opening and Closing a File
119	Detecting end-of-file
120	More about Open(): File Modes
121	File Pointers and their Manipulations
122	Sequential Input and Output Operations
123	Updating a File: Random Access
124	Error Handling During File Operations
125	Command-line Arguments
	Templates
126	Introduction
127	Class Templates
128	Class Templates with Multiple Parameters
129	Function Templates
130	Function Templates with Multiple Parameters
131	Overloading of Template Functions
132	Member Function Templates
133	Nontype Template Arguments
	Exception Handling
134	Introduction
135	Basics of Exception Handling
136	Exception Handling Mechanism
137	Throwing Mechanism
138	Catching Mechanism
139	Re-throwing an Exception
140	Specifying Exceptions
141	Exceptions in Constructors and Destructors
142	Exceptions in Operator Overloaded Functions
	Introduction to the Standard Template Library
143	Introduction
144	Components of STL
145	Containers

Core Programming: Reference-3

	The Object-Oriented Through Process
	Introduction to Object-Oriented Concepts
01	Procedural Versus OO Programming
03	Moving from Procedural to Object-Oriented Development – Topics 2
05	What Exactly is an Object – Topics 2
09	What Exactly is a Class – Topics 4
10	Using UML to Model a Class Diagram
14	Encapsulation and Data Hiding – Topics 4
17	Inheritance – Topics 3
18	Polymorphism
20	Composition – Topics 2
	Conclusion
	Example Code Used in This Chapter
	How to Think in Terms of Objects
23	Knowing the Difference Between the Interface and the Implementation – Topics 3
24	Using Abstract Thinking When Designing Interfaces
29	Giving the User the Minimal Interface Possible – Topics 5
	Conclusion
	References
	Advanced Object-Oriented Concepts
35	Constructors – Topics 6
39	Error Handling – Topics 4
42	The Concept of Scope – Topics 3
43	Operator Overloading
44	Multiple Inheritance
45	Object Operations
	Conclusion
	References
	Example Code Used in This Chapter
	The Anatomy of a Class
46	The Name of the Class
47	Comments
48	Attributes
49	Constructors
50	Accessors
51	Public Interface Methods
52	Private Implementation Methods
	Conclusion
	References
	Example Code Used in This Chapter
	Class Design Guidelines
53	Modeling Real World Systems
55	Identifying the Public Interfaces – Topics 2
56	Designing Robust Constructors (and Perhaps Destructors)
57	Designing Error Handling into a Class
59	Documenting a Class and Using Comments – Topics 1
60	Designing with Reuse in Mind – Topics 1
65	Designing with Extensibility in Mind – Topics 5
67	Designing with Maintainability in Mind – Topics 2
68	Using Object Persistence – Topics 1
	Conclusion
	References

Discrete Mathematics

	Discrete Mathematics and Its Applications
	The Foundations: Logic and Proofs
06	Propositional Logic – Topics 6
12	Applications of Propositional Logic – Topics 6
19	Propositional Equivalences – Topics 7
32	Predicates and Quantifiers – Topics 13
39	Nested Quantifiers – Topics 7
47	Rules of Inference – Topics 8
56	Introduction to Proofs – Topics 9
66	Proof Methods and Strategy – Topics 10
	End-of-Chapter Material
	Basic Structures: Sets, Functions, Sequences, Sums
74	Sets – Topics 8
79	Set Operations – Topics 5
85	Functions – Topics 6
90	Sequences and Summations – Topics 5
93	Cardinality of Sets – Topics 3
97	Matrices – Topics 4
	End-of-Chapter Material
	Algorithms
103	Algorithms – Topics 6
108	The Growth of Functions – Topics 5
113	Complexity of Algorithms – Topics 5
	End-of-Chapter Material
	Number Theory and Cryptography
118	Divisibility and Modular Arithmetic – Topics 5
122	Integer Representations and Algorithms – Topics 4
130	Primes and Greatest Common Divisors – Topics 8
137	Solving Congruencies – Topics 7
140	Applications of Congruencies – Topics 3
149	Cryptography – Topics 9
	End-of-Chapter Material
	Induction and Recursion
157	Mathematical Induction – Topics 8
162	Strong Induction and Well-Ordering – Topics 5
167	Recursive Definitions and Structural Induction – Topics 5
171	Recursive Algorithms – Topics 4
176	Program Correctness – Topics 5
	End-of-Chapter Material
	Counting
182	The Basics of Counting – Topics 6
185	The Pigeonhole Principle – Topics 3
188	Permutations and Combinations – Topics 3
191	Binominal Coefficients and Identities – Topics 3
196	Generalized Permutations and Combinations – Topics 5
199	Generating Permutations and Combinations – Topics 3
	End-of-Chapter Material
	Discrete Probability
203	An Introduction to Discrete Probability – Topics 4
213	Probability Theory – Topics 10
216	Bayes' Theorem – Topics 3
224	Expected Value and Variance – Topics 8

Data Structure

Data Structure: Reference-1

	Fundamentals of Data Structures in C
	Basic Concepts
01	Overview: System Life Cycle
03	Algorithm Specification – Topics 2
04	Data Abstraction
08	Performance Analysis – Topics 4
09	Performance Measurement
	References and Selected Readings
	Arrays and Structures
10	The Array as an Abstract Data Type
14	Structures and Unions – Topics 4
17	The Polynomial Abstract Data Type – Topics 3
18	The Representation of Multidimensional Arrays
21	The String Abstract Data Type – Topics 3
22	The Representation of Multidimensional Arrays
24	The String Abstract Data Type – Topics 2
	References and Selected Readings
	Additional Exercises
	Stacks ad Queues
25	The Sack Abstract Data Type
26	The Queue Abstract Data Type
27	A Mazing Problem
30	Evaluation of Expressions – Topics 3
31	Multiple Stacks and Queues
	Selected Readings and References
	Additional Exercises
	Lists
33	Pointers – Topics 2
34	Singly Linked Lists
35	Dynamically Linked Stacks and Queues
40	Polynomials – Topics 5
41	Equivalence Relations
42	Sparse Matrices
43	Doubly Linked Lists
	References and Selected Readings
	Additional Exercises
	Trees
45	Introduction – Topics 2
48	Binary Trees – Topics 3
49	Binary Tree Traversals
50	Additional Binary Tree Operations
51	Threaded Binary Trees
55	Heaps – Topics 4
60	Binary Search Trees – Topics 5
61	Selection Trees
63	Forests – Topics 2
65	Set Representation – Topics 2
69	Counting Binary Trees – Topics 4
	References and Selected Readings
	Additional Exercises

Data Structure: Reference-2

	Data Structures and Program Design in C++
	Programming Principles
01	Introduction
05	The Game of Life – Topics 4
08	Programming Style – Topics 3
16	Coding, Testing, and Further Refinement – Topics 8
19	Program Maintenance – Topics 3
23	Conclusions and Preview – Topics 4
	Pointers and Pitfalls
	Review Questions
	References for Further Study – Topics 4
	Introduction to Stacks
28	Stack Specifications – Topics 5
32	Implementation of Stacks – Topics 4
33	Application: A Desk Calculator
34	Application: Bracket Matching
37	Abstract Data Types and Their Implementations – Topics 3
	Pointers and Pitfalls
	Review Questions
	References for Further Study
	Queues
39	Definitions – Topics 2
40	Implementations of Queues
41	Circular Implementation of Queues in C++
42	Demonstration and Testing
49	Application of Queues: Simulation – Topics 7
	Pointers and Pitfalls
	Review Questions
	References for Further Study
	Linked Stacks and Queues
52	Pointers and Linked Structures – Topics 3
53	Linked Stacks
57	Linked Stacks with Safeguards – Topics 4
59	Linked Queues – Topics 2
65	Applications: Polynomial Arithmetic – Topics 6
66	Abstract Data Types and Their Implementations
	Pointers and Pitfalls
	Review Questions
	Recursion
70	Introduction to Recursion – Topics 4
75	Principles of Recursion – Topics 5
82	Backtracking: Postponing the Work – Topics 7
87	Tree-Structured Programs: Look-Ahead in Games – Topics 5
	Pointers and Pitfalls
	Review Questions
	References for Further Study
	Lists and Strings
88	List Definition – Topics 1
94	Implementation of Lists – Topics 6
97	Strings – Topics 3
99	Application: A Text Editor – Topics 2
100	Linked Lists in Arrays

Algorithm

Algorithm: Reference-1

	Computer Algorithms
	Introduction
01	What is an Algorithm?
03	Algorithm Specification – Topics 2
08	Performance Analysis – Topics 5
13	Randomized Algorithms – Topics 5
	References and readings
	Elementary Data Structures
14	Stacks and Queues
16	Trees – Topics 2
18	Dictionaries – Topics 2
20	Priority Queues – Topics 2
22	Sets and Disjoint Set Union – Topics 2
25	Graphs – Topics 3
	References and Readings
	Divide-and-Conquer
26	General Method
27	Binary Search
28	Finding the Maximum and Minimum
29	Merge Sort
31	Quick Sort – Topics 2
33	Selection – Topics 2
34	Strassen's Matrix Multiplication
38	Convex Hull – Topics 4
	References and Readings
	Additional Exercises
	The Greedy Method
39	The General Method
40	Knapsack Problem
41	Tree Vertex Splitting
45	Job Sequencing with Deadlines
48	Minimum-Cost Spanning Trees – Topics 3
49	Optimal Storage on Tapes
50	Optimal Merge Patterns
51	Single-Source Shortest Paths
	References and Readings
	Additional Exercises
	Dynamic Programming
52	The General Method
53	Multistage Graphs
54	All Pairs Shortest Paths General Weights
55	Optimal Binary Search Trees
56	String Editing
57	0/1-Knapsack
58	Reliability Design
59	The Traveling Salesperson Problem
60	Flow Shop Scheduling
	References and Readings
	Additional Exercises
	Basic Traversal and Search Techniques

Algorithm: Reference-2

Algorithm: Reference-3

	The Design and Analysis of Computer Algorithms
	Models of Computation
01	Algorithms and Their Complexity
02	Random Access Machines
03	Computational Complexity of RAM Programs
04	A Stored Program Model
05	Abstractions of the RAM
06	A Primitive Model of Computation: The Turing Machine
07	Relationship Between the Turning Machine and RAM Models
08	Pidgin ALGOL – A High-Level Language
	Design of Efficient Algorithms
09	Data Structures: Lists, Queues, and Stacks
10	Set Representations
11	Graphs
12	Trees
13	Recursion
14	Divide-and-Conquer
15	Balancing
16	Dynamic Programming
17	Epilogue
	Sorting and Order Statistics
18	The Sorting Problem
19	Radix Sorting
20	Sorting by Comparisons
21	Heapsort – an O(n log n) Comparison Sort
22	Quicksort – an O(n log n) Expected Time Sort
23	Order Statistics
24	Expected Time for Order Statistics
	Data Structures for Set Manipulation Problems
25	Fundamental Operations on Sets
26	Hashing
27	Binary Search
28	Binary Search Trees
29	Optimal Binary Search Trees
30	A Simple Disjoint-Set Union Algorithm
31	Tree Structures for the UNION-FIND Problem
32	Applications and Extensions of the UNION-FIND Algorithm
33	Balanced Tree Schemes
34	Dictionaries and Priority Queues
35	Mergeable Heaps
36	Concatenable Queues
37	Partitioning
	Algorithms on Graphs
38	Minimum-Cost Spanning Trees
39	Depth-First Search
40	Bi-connectivity
41	Depth-First Search of a Directed Graph
42	Strong Connectivity
43	Path-Finding Problems
44	A Transitive Closure Algorithm
45	A Shortest-Path Algorithm
46	Path Problems and Matrix Multiplication

47	Single-Source Problems
48	Dominators in a Directed Acyclic Graph: Putting the Concepts Together
	Matrix Multiplication and Related Operations
49	Basics
50	Strassen's Matrix-Multiplication Algorithm
51	Inversion of Matrices
52	LUP Decomposition of Matrices
53	Applications of LUP Decomposition
54	Boolean Matrix Multiplication
	The Fast Fourier Transform and Its Applications
55	The Discrete Fourier Transform and Its Inverse
56	The Fast Fourier Transform Algorithm
57	The FFT Using Bit Operations
58	Products of Polynomials
59	The Schonhage-Strassen Integer-multiplication Algorithm
	Integer and Polynomial Arithmetic
60	The Similarity Between Integers and Polynomials
61	Integer Multiplication and Division
62	Polynomial Multiplication and Division
63	Modular Arithmetic
64	Modular Polynomial Arithmetic and Polynomial Evaluation
65	Chinese Remaindering
66	Chinese Remaindering and Interpolation of Polynomials
67	Greatest Common Divisors and Euclid's Algorithm
68	An Asymptotically Fast Algorithm for Polynomial GCD's
69	Integer GCD's
70	Chinese Remaindering Revisited
71	Sparse Polynomials
	Pattern-Matching Algorithms
72	Finite Automata and Regular Expressions
73	Recognition of Regular Expression Patterns
74	Recognition of Substrings
75	Tow –way Deterministic Pushdown Automata
76	Position Trees and Substring Identifiers
	NP-Complete Problems
77	Nondeterministic Turing Machines
78	The Classes P and NP
79	Languages and Problems
80	NP-Completeness of the Satisfiability Problem
81	Additional NP-Complete Problems
82	Polynomial-Space-Bounded Problems
	Some Provably Intractable Problems
83	Complexity Hierarchies
84	The Space Hierarchy for Deterministic Turing Machines
85	A Problem Requiring Exponential Time and Space
86	A Non-elementary Problem
	Lower Bounds on Numbers of Arithmetic Operations
87	Fields
88	Straight-Line Code Revisited
89	A Matrix Formulation of Problems
90	A Row-Oriented Lower Bound on Multiplications
91	A Column-Oriented Lower Bound on Multiplications
92	A Row-and-Column-Oriented Bound on Multiplications
93	Preconditioning

Database Management System

Software Engineering

Software Engineering: Reference-1

	Fundamentals of Software Engineerign
	Introduction
03	Evolution – From an Art Form to an Engineering Discipline – Topics 3
05	Software Development Projects – Topics 2
07	Exploratory Style of Software Development – Topics 2
15	Emergence of Software Engineering – Topics 8
16	Notable Changes in Software Development Practices
17	Computer Systems Engineering
	Summary and Exercises
	Software Life Cycle Models
18	A Few Basic Concepts
24	Waterfall Model and its Extensions – Topics 6
27	Rapid Application Development (RAD) – Topics 3
31	Agile Development Models – Topics 4
32	Spiral Model – Topics 1
33	A Comparison of Different Life Cycle Models – Topics 1
	Software Project Management
34	Software Project Management Complexities
36	Responsibilities of a Software Project Manager – Topics 2
28	Project Planning – Topics 2
30	Metrics for Project Size Estimation – Topics 2
33	Project Estimation Techniques – Topics 3
35	Empirical Estimation Techniques – Topics 2
38	COCOMO – A Heuristic Estimation Technique – Topics 4
43	Halstead's Software Science – An Analytical Technique – Topics 5
46	Staffing Level Estimation – Topics 3
51	Scheduling – Topics 5
53	Organization and Team Structures – Topics 2
54	Staffing
57	Risk Management – Topics 3
59	Software Configuration Management – Topics 2
60	Miscellaneous Plans
	Summary
	Requirements Analysis and Specification
62	Requirements Gathering and Analysis – Topics 2
73	Software Requirements Specification (SRS) – Topics 11
75	Formal System Specification – Topics 2
76	Axiomatic Specification
78	Algebraic Specification – Topics 2
79	Executable Specification and 4GL
	Summary and Exercises
	Software Design
82	Overview of the Design Process – Topics 3
83	How to Characterize a Good Software Design? – Topics 1
85	Cohesion and Coupling – Topics 2
86	Layered Arrangement of Modules
88	Approaches to Software Design – Topics 2
	Summary and Exercises
	Function-Oriented Software Design
89	Overview of SA/SD Methodology

	Computer Aided Software Engineering
203	Case and Its Scope
204	Case Environment – Topics 1
208	CASE Support in Software Life Cycle – Topics 4
215	Other Characteristics of Case Tools – Topics 7
216	Towards Second Generation CASE Tool
217	Architecture of a Case Environment
	Summary and Exercises
	Software Maintenance
219	Characteristics of Software Maintenance – Topics 2
220	Software Reverse Engineering
221	Software Maintenance Process Models
222	Estimation of Maintenance Cost
	Summary and Exercises
	Software Reuse
223	What Can be Reused?
224	Why Almost No Reuse So Far?
225	Basic Issues in any Reuse Program
230	A Reuse Approach – Topics 5
231	Reuse at Organization Level – Topics 1
	Summary and Exercises
	Emerging Trends
232	Client-Server Software
233	Client-Server Architectures
237	CORBA – Topics 4
239	COM/DCOM – Topics 2
240	Service-Oriented Architecture (SOA) – Topics 1
241	Software as a Service (SaaS)
	Summary and Exercises

Software Engineering: Reference-2

	Software Engineering: A Practitioner's Approach
	Software and Software Engineering
03	The Nature of Software – Topics 3
04	The Unique nature of WebApps
05	Software Engineering
06	The Software Process
08	Software Engineering Practice – Topics 2
09	Software Myths
10	How It All Starts
	Summary
	Problems and Points to Ponder
	Part-1: The Software Process
	Process Models
13	A Generic Process Model – Topics 3
14	Process Assessment and Improvement
19	Prescriptive Process Models – Topics 5
22	Specialized Process Models – Topics 3
24	The Unified Process – Topics 2
26	Personal and Team Process Models – Topics 2
27	Process Technology
28	Product and Process
	Summary
	Agile Development
29	What is Agility
30	Agility and the Cost of Change
33	What Is an Agile Process – Topics 3
37	Extreme Programming (XP) – Topics 4
45	Other Agile Process Models – Topics 8
46	A Tool Set for the Agile Process
	Summary
	Part-2: Modeling
	Principles That Guide Practice
47	Software Engineering Knowledge
49	Core Principles – Topics 2
54	Principles That Guide Each Framework Activity – Topics 5
	Summary
	Understanding Requirements
55	Requirements Engineering
59	Establishing the Groundwork – Topics 4
63	Eliciting Requirements – Topics 4
64	Developing Use Cases
66	Building the Requirements Model – Topics 2
67	Negotiating Requirements
68	Validating Requirements
	Summary
	Requirements Modeling: Scenarios, Information, and Analysis Classes
72	Requirements Analysis – Topics 4
75	Scenario-Based Modeling – Topics 3
77	UML Models That Supplement the Use Case – Topics 2
80	Data Modeling Concepts – Topics 3
86	Class-Based Modeling – Topics 6
	Summary

Pure Mathematics – 1, 2, and 3

	Pure Mathematics (A-Level)
	P1: Algebra
01	Background Algebra
02	Linear Equations
03	Changing the Subject of a Formula
04	Quadratic Equations
05	Solving Quadratic Equations
06	Equations that cannot be Factorized
07	The Graphs of Quadratic Function
08	The Quadratic Formula
09	Inequalities
	P2: Algebra
10	Operations with Polynomials
11	Solution of Polynomial Equations
12	The Modulus Function
	P3: Further Algebra
13	The General Binomial Expansion
14	Review of Algebraic Functions
15	Partial Functions
16	Using Partial Functions with The Binomial Expansion
	P1: Co-Ordinate Geometry
17	Co-Ordinates
18	Plotting, Sketching and Drawing
19	The Gradient of a Line
20	The Distance Between Two Points
21	The Mid-Point of a Line Joining Two Points
22	The Equation of a Straight Line
23	Finding the Equation of a Line
24	The Intersection of Two Line
25	Drawing Curves
26	The Intersection of A Line and A Curve
	P1: Sequences and Series
27	Definitions and Notation
28	Arithmetic Progressions
29	Geometric Progressions
30	Binomial Expansions
	P1: Functions
31	The Language of Functions
32	Composite Functions
33	Inverse Functions
	P1: Differentiation
34	The gradient of a Curve
35	Finding the Gradient of a Curve
36	Finding the Gradient from First Principles
37	Differentiating by Using Standard Results
38	Using Differentiation
39	Tangents and Normals
40	Maximum and Minimum Points
41	Increasing and Decreasing Functions
42	Points of Inflection
43	The Second Derivative
44	Applications

45	The Chain Rule
	P2: Differentiation
46	The Product Rule
47	The Quotient Rule
48	Differentiating Natural Logarithms and Exponentials
49	Differentiating Trigonometrical Functions
50	Differentiating Functions Defined Implicitly
51	Parametric Equations
52	Parametric Differentiation
	P3: Differential Equations
53	Forming Differential Equations from Rates of Change
54	Solving Differential Equations
	P1: Integration
55	Reversing Differentiation
56	Finding the Area Under A Curve
57	Area as The Limit of A Sum
58	Areas Below the X Axis
59	The Area Between Tow Curves
60	The Area Between A Curve and the Y Axis
61	The Reverse Chain Rule
62	Improper Integrals
63	Finding Volumes by Integration
	P2: Integration
64	Integrals Involving The Exponential Function
65	Integrals Involving The Natural Logarithm Function
66	Integrals Involving Trigonometrical Functions
67	Numerical Integration
	P3: Further Integration
68	Integration by Substitution
69	Integrals Involving Exponentials and Natural Logarithms
70	Integrals Involving Trigonometrical Function
71	The Use of Partial Fractions in Integration
72	Integration by Parts
73	General Integration
	P1: Trigonometry
74	Trigonometry Background
75	Trigonometrical Functions
76	Trigonometrical Functions for Angles of any Size
77	The sine and cosine Graphs
78	The tangent graph
79	Solving Equations using Graphs of Trigonometrical Functions
80	Circular Measure
81	The Length of An ARC of A Circle
82	The Area of A Sector of A Circle
83	Other Trigonometrical Functions
	P2: Trigonometry
84	Reciprocal Trigonometrical Functions
85	Compound-Angle Formulae
86	Double-Angle Formulae
87	The Forms rcos, rsin
88	The General Solutions of Trigonometrical Equations
	P1: Vectors
89	Vectors in Two Dimensions
90	Vectors in Three Dimensions
91	Vectors Calculations

92	The Angle Between Two Vectors
	P3: Vectors
93	The Vector Equation of a Line
94	The Intersection of Two Lines
95	The Angle Between Two Lines
96	The Perpendicular Distance from A Point to a Line
97	The Vector Equation of a Plane
98	The Intersection of A Line and A Plane
99	The Distance of A Point from A Plane
100	The Angle Between A Line and A Plane
101	The Intersection of Two Planes
	P2: Logarithms and Exponentials
102	Logarithms
103	Exponential Functions
104	Modelling Curves
105	The Natural Logarithm Functions
106	The Exponential Function
	P2: Numerical Solution of Equations
107	Interval Estimation – Change-of-Sign Methods
108	Fixed-Point Iteration
	P3: Complex Numbers
109	The Growth of the Number System
110	Working with Complex Numbers
111	Representing Complex Numbers Geometrically
112	Sets of Points in An Argand Diagram
113	The Modulus-Argument form of Complex Numbers
114	Sets of Points Using The Polar Form
115	Working with Complex Numbers in Polar Form
116	Complex Exponents
117	Complex Numbers and Equations