

Table of Contents

PREFACE	11
ABOUT THE AUTHOR.....	11
ACKNOWLEDGMENTS.....	12
WHO SHOULD BUY THIS BOOK?.....	12
CONVENTIONS USED IN THIS BOOK.....	12
HOW TO REPORT ERRATA.....	14
WHERE TO DOWNLOAD MATERIAL ABOUT THIS BOOK.....	14
CHAPTER 1 HOW A COMPUTER WORKS	15
1.1 INTRODUCTION.....	15
1.2 WHAT IS HARDWARE?.....	15
1.3 WHAT IS SOFTWARE?.....	16
1.4 HOW A COMPUTER EXECUTES (RUNS) A PROGRAM.....	16
1.5 COMPILERS AND INTERPRETERS.....	17
1.6 WHAT IS SOURCE CODE?.....	17
1.7 REVIEW QUESTIONS: TRUE/FALSE.....	18
1.8 REVIEW QUESTIONS: MULTIPLE CHOICE.....	18
1.9 REVIEW QUESTIONS.....	20
CHAPTER 2 C# AND INTEGRATED DEVELOPMENT ENVIRONMENTS (IDES)	21
2.1 WHAT IS C#?.....	21
2.2 HOW C# WORKS.....	21
2.3 INTEGRATED DEVELOPMENT ENVIRONMENTS.....	23
2.4 VISUAL STUDIO.....	23
2.5 HOW TO SET UP VISUAL STUDIO COMMUNITY.....	24
2.6 REVIEW QUESTIONS.....	27
CHAPTER 3 BASIC ALGORITHMIC CONCEPTS	29
3.1 WHAT IS AN ALGORITHM?.....	29
3.2 THE ALGORITHM FOR MAKING A CUP OF TEA.....	29
3.3 OKAY ABOUT ALGORITHMS. BUT WHAT IS A COMPUTER PROGRAM ANYWAY?.....	30
3.4 THE THREE PARTIES!.....	30
3.5 THE THREE MAIN STAGES INVOLVED IN CREATING AN ALGORITHM.....	30
3.6 WHAT ARE “RESERVED WORDS”?.....	31
3.7 YOUR FIRST C# PROGRAM.....	32
3.8 WHAT IS THE DIFFERENCE BETWEEN A SYNTAX ERROR, A LOGIC ERROR, AND A RUNTIME ERROR?.....	32
3.9 WHAT DOES “DEBUGGING” MEAN?.....	33
3.10 COMMENTING YOUR CODE.....	33
3.11 REVIEW QUESTIONS: TRUE/FALSE.....	34
3.12 REVIEW QUESTIONS: MULTIPLE CHOICE.....	35
3.13 REVIEW QUESTIONS.....	36
CHAPTER 4 VARIABLES	37
4.1 WHAT IS A VARIABLE?.....	37
4.2 WHAT IS A CONSTANT?.....	39
4.3 HOW MANY TYPES OF VARIABLES AND CONSTANTS EXIST?.....	39
4.4 RULES FOR NAMING VARIABLES AND CONSTANTS IN C#.....	40
4.5 WHAT DOES THE PHRASE “DECLARE A VARIABLE” MEAN?.....	40
4.6 HOW TO DECLARE VARIABLES IN C#.....	41
4.7 HOW TO DECLARE CONSTANTS IN C#.....	42
4.8 REVIEW QUESTIONS: TRUE/FALSE.....	43
4.9 REVIEW QUESTIONS: MULTIPLE CHOICE.....	43
4.10 REVIEW EXERCISES.....	44

4.1.1	REVIEW QUESTIONS	45
CHAPTER 5	HANDLING INPUT AND OUTPUT	47
5.1	HOW TO OUTPUT MESSAGES AND RESULTS TO A USER'S SCREEN?	47
5.2	HOW TO OUTPUT SPECIAL CHARACTERS	49
5.3	HOW TO PROMPT THE USER TO ENTER DATA?	50
5.4	REVIEW QUESTIONS: TRUE/FALSE	52
5.5	REVIEW QUESTIONS: MULTIPLE CHOICE.....	52
5.6	REVIEW QUESTIONS	53
CHAPTER 6	OPERATORS.....	55
6.1	THE VALUE ASSIGNMENT OPERATOR	55
6.2	ARITHMETIC OPERATORS.....	56
6.3	WHAT IS THE PRECEDENCE OF ARITHMETIC OPERATORS?.....	57
6.4	COMPOUND ASSIGNMENT OPERATORS	58
	<i>Exercise 6.4.1 Which C# Statements are Syntactically Correct?</i>	58
	<i>Exercise 6.4.2 Finding Variable Types</i>	59
6.5	INCREMENTING/DECREMENTING OPERATORS.....	59
6.6	STRING OPERATORS	61
	<i>Exercise 6.6.1 Concatenating Names</i>	61
6.7	REVIEW QUESTIONS: TRUE/FALSE	62
6.8	REVIEW QUESTIONS: MULTIPLE CHOICE.....	62
6.9	REVIEW EXERCISES.....	64
6.10	REVIEW QUESTIONS	65
CHAPTER 7	USING VISUAL STUDIO	67
7.1	WRITING AND EXECUTING A C# PROGRAM	67
7.2	FINDING RUNTIME AND SYNTAX ERRORS	73
CHAPTER 8	WRITING YOUR FIRST REAL PROGRAMS.....	75
8.1	INTRODUCTION.....	75
	<i>Exercise 8.1.1 Calculating the Area of a Rectangle</i>	76
	<i>Exercise 8.1.2 Calculating the Area of a Circle</i>	76
	<i>Exercise 8.1.3 Fahrenheit to Celsius</i>	77
8.2	REVIEW EXERCISES.....	78
8.3	REVIEW QUESTIONS	80
CHAPTER 9	MANIPULATING NUMBERS	81
9.1	INTRODUCTION.....	81
9.2	USEFUL MATHEMATICAL METHODS (SUBPROGRAMS), AND MORE	81
9.3	REVIEW QUESTIONS: TRUE/FALSE	85
9.4	REVIEW EXERCISES.....	85
9.5	REVIEW QUESTIONS	86
CHAPTER 10	MANIPULATING STRINGS.....	87
10.1	INTRODUCTION.....	87
10.2	RETRIEVING INDIVIDUAL CHARACTERS FROM A STRING.....	87
10.3	USEFUL STRING METHODS (SUBPROGRAMS), AND MORE.....	88
	<i>Exercise 10.3.1 Displaying a String Backward</i>	92
	<i>Exercise 10.3.2 Switching the Order of Names</i>	93
	<i>Exercise 10.3.3 Creating a Login ID</i>	94
	<i>Exercise 10.3.4 Creating a Random Word</i>	94
10.4	REVIEW QUESTIONS: TRUE/FALSE	95
10.5	REVIEW QUESTIONS: MULTIPLE CHOICE.....	96
10.6	REVIEW EXERCISES.....	97
10.7	REVIEW QUESTIONS	97

CHAPTER 11	MAKING QUESTIONS	99
11.1	INTRODUCTION	99
11.2	WHAT IS A BOOLEAN EXPRESSION?	99
11.3	HOW TO WRITE SIMPLE QUESTIONS	99
	<i>Exercise 11.3.1 Filling in the Table</i>	100
11.4	LOGICAL OPERATORS AND COMPLEX BOOLEAN EXPRESSIONS	101
11.5	ASSIGNING THE RESULT OF A BOOLEAN EXPRESSION TO A VARIABLE.....	103
11.6	WHAT IS THE ORDER OF PRECEDENCE OF LOGICAL OPERATORS?	103
11.7	WHAT IS THE ORDER OF PRECEDENCE OF ARITHMETIC, COMPARISON, AND LOGICAL OPERATORS?	104
	<i>Exercise 11.7.1 Filling in the Truth Table</i>	104
11.8	CONVERTING ENGLISH SENTENCES TO BOOLEAN EXPRESSIONS	105
11.9	REVIEW QUESTIONS: TRUE/FALSE	107
11.10	REVIEW QUESTIONS: MULTIPLE CHOICE	108
11.11	REVIEW EXERCISES	109
11.12	REVIEW QUESTIONS	110
CHAPTER 12	ASKING QUESTIONS – THE IF STRUCTURE	111
12.1	THE IF STRUCTURE	111
	<i>Exercise 12.1.1 Find Out What is Displayed</i>	113
	<i>Exercise 12.1.2 Are you Allowed to Drive a Car?</i>	114
	<i>Exercise 12.1.3 Finding Minimum and Maximum Values with if Structures</i>	114
	<i>Exercise 12.1.4 Finding the Name of the Heaviest Person</i>	116
12.2	REVIEW QUESTIONS: TRUE/FALSE	117
12.3	REVIEW QUESTIONS: MULTIPLE CHOICE.....	117
12.4	REVIEW EXERCISES	118
12.5	REVIEW QUESTIONS	119
CHAPTER 13	ASKING QUESTIONS - THE IF-ELSE STRUCTURE	121
13.1	THE IF-ELSE STRUCTURE	121
	<i>Exercise 13.1.1 Finding the Output Message</i>	122
	<i>Exercise 13.1.2 Who is the Greatest?</i>	122
	<i>Exercise 13.1.3 Is it an Integer?</i>	123
	<i>Exercise 13.1.4 Converting Gallons to Liters, and Vice Versa</i>	124
13.2	REVIEW QUESTIONS: TRUE/FALSE	125
13.3	REVIEW QUESTIONS: MULTIPLE CHOICE.....	125
13.4	REVIEW EXERCISES	127
CHAPTER 14	ASKING QUESTIONS - THE IF-ELSE-IF STRUCTURE	129
14.1	THE IF-ELSE-IF STRUCTURE.....	129
	<i>Exercise 14.1.1 Find Out What is Displayed</i>	131
	<i>Exercise 14.1.2 Counting the Digits</i>	132
	<i>Exercise 14.1.3 The Days of the Week</i>	133
	<i>Exercise 14.1.4 Where is the Tollkeeper?</i>	134
14.2	REVIEW QUESTIONS: TRUE/FALSE	135
14.3	REVIEW EXERCISES	135
CHAPTER 15	ASKING QUESTIONS - NESTED STRUCTURES	141
15.1	NESTED DECISION STRUCTURES.....	141
	<i>Exercise 15.1.1 Find Out What is Displayed</i>	142
	<i>Exercise 15.1.2 Positive, Negative, or Zero?</i>	143
	<i>Exercise 15.1.3 The Most Scientific Calculator Ever!</i>	144
15.2	REVIEW QUESTIONS: TRUE/FALSE	145
15.3	REVIEW EXERCISES	145
15.4	REVIEW QUESTIONS	146
CHAPTER 16	DOING LOOPS	147

16.1	WHAT IS A LOOP STRUCTURE?.....	147
16.2	FROM SEQUENCE TO LOOP STRUCTURE	147
16.3	REVIEW QUESTIONS: TRUE/FALSE	149
CHAPTER 17	DOING LOOPS - THE WHILE AND THE DO-WHILE STRUCTURES	151
17.1	THE WHILE STRUCTURE.....	151
	<i>Exercise 17.1.1</i> <i>Counting the Total Number of Iterations</i>	152
	<i>Exercise 17.1.2</i> <i>Finding the Sum of Four Numbers</i>	153
	<i>Exercise 17.1.3</i> <i>Finding the Sum of Positive Numbers</i>	154
	<i>Exercise 17.1.4</i> <i>Finding the Sum of N Numbers</i>	154
	<i>Exercise 17.1.5</i> <i>Finding the Sum of an Unknown Quantity of Numbers</i>	155
	<i>Exercise 17.1.6</i> <i>Finding the Product of Five Numbers</i>	156
17.2	THE DO-WHILE STRUCTURE	157
	<i>Exercise 17.2.1</i> <i>Counting the Total Number of Iterations</i>	158
	<i>Exercise 17.2.2</i> <i>Counting 2-digit Numbers</i>	159
	<i>Exercise 17.2.3</i> <i>How Many Numbers Fit in a Sum</i>	159
17.3	REVIEW QUESTIONS: TRUE/FALSE	160
17.4	REVIEW QUESTIONS: MULTIPLE CHOICE.....	161
17.5	REVIEW EXERCISES.....	163
CHAPTER 18	DOING LOOPS - THE FOR AND THE FOREACH STRUCTURES	167
18.1	THE FOR STRUCTURE	167
	<i>Exercise 18.1.1</i> <i>Find Out What is Displayed</i>	169
	<i>Exercise 18.1.2</i> <i>Find Out What is Displayed</i>	170
	<i>Exercise 18.1.3</i> <i>Finding the Sum of Four Numbers</i>	170
	<i>Exercise 18.1.4</i> <i>Finding the Average Value of N Numbers</i>	171
18.2	THE FOREACH STRUCTURE	172
18.3	REVIEW QUESTIONS: TRUE/FALSE	173
18.4	REVIEW QUESTIONS: MULTIPLE CHOICE.....	174
18.5	REVIEW EXERCISES.....	175
CHAPTER 19	DOING LOOPS – NESTED STRUCTURES.....	179
19.1	NESTED LOOP STRUCTURES	179
	<i>Exercise 19.1.1</i> <i>Counting the Total Number of Iterations</i>	180
	<i>Exercise 19.1.2</i> <i>Find Out What is Displayed</i>	181
19.2	REVIEW QUESTIONS: TRUE/FALSE	182
19.3	REVIEW QUESTIONS: MULTIPLE CHOICE.....	182
19.4	REVIEW EXERCISES.....	184
CHAPTER 20	TIPS AND TRICKS WITH LOOP STRUCTURES	187
20.1	INTRODUCTION.....	187
20.2	CHOOSING A LOOP STRUCTURE.....	187
20.3	THE “ULTIMATE” RULE.....	188
20.4	BREAKING OUT OF A LOOP.....	191
20.5	ENDLESS LOOPS AND HOW TO AVOID THEM.....	192
20.6	THE “FROM INNER TO OUTER” METHOD.....	193
20.7	REVIEW QUESTIONS: TRUE/FALSE	194
20.8	REVIEW QUESTIONS: MULTIPLE CHOICE.....	195
20.9	REVIEW EXERCISES.....	196
CHAPTER 21	MORE EXERCISES WITH LOOP STRUCTURES.....	199
21.1	EXERCISES OF A GENERAL NATURE WITH LOOP STRUCTURES	199
	<i>Exercise 21.1.1</i> <i>Finding the Sum of $1 + 2 + 3 + \dots + 100$</i>	199
	<i>Exercise 21.1.2</i> <i>Finding the Product of $2 \times 4 \times 6 \times 8 \times 10$</i>	200
	<i>Exercise 21.1.3</i> <i>Finding the Average Value of Positive Numbers</i>	201
	<i>Exercise 21.1.4</i> <i>Counting the Numbers According to Which is Greater</i>	202
	<i>Exercise 21.1.5</i> <i>Counting the Numbers According to Their Digits</i>	203

	<i>Exercise 21.1.6</i>	<i>How Many Numbers Fit in a Sum</i>	203
	<i>Exercise 21.1.7</i>	<i>Iterating as Many Times as the User Wishes</i>	204
	<i>Exercise 21.1.8</i>	<i>Finding Minimum Value with Loop Structures</i>	205
	<i>Exercise 21.1.9</i>	<i>Fahrenheit to Kelvin, from 0 to 100</i>	207
	<i>Exercise 21.1.10</i>	<i>Rice on a Chessboard</i>	207
	<i>Exercise 21.1.11</i>	<i>Game - Find the Secret Number</i>	208
21.2	REVIEW EXERCISES		210
CHAPTER 22	TURTLE GRAPHICS		213
22.1	INTRODUCTION		213
22.2	THE X-Y PLANE		213
22.3	WHERE IS THE TURTLE?		215
22.4	MOVING FORWARD AND BACKWARD.....		219
22.5	TURNING LEFT AND RIGHT		220
	<i>Exercise 22.5.1</i>	<i>Drawing a Rectangle</i>	222
	<i>Exercise 22.5.2</i>	<i>Drawing a Rectangle of Custom Size</i>	223
22.6	SET THE ORIENTATION TO A SPECIFIED ANGLE		224
22.7	SETTING THE DELAY		225
22.8	CHANGING PEN'S COLOR AND SIZE.....		226
22.9	PULLING TURTLE'S PEN UP OR DOWN		227
	<i>Exercise 22.9.1</i>	<i>Drawing a House</i>	228
22.10	MOVING A TURTLE DIRECTLY TO A SPECIFIED POSITION		229
22.11	USING DECISION AND LOOP STRUCTURES WITH TURTLES.....		230
	<i>Exercise 22.11.1</i>	<i>Drawing Squares of Different Sizes</i>	233
	<i>Exercise 22.11.2</i>	<i>Drawing Houses of Different Sizes</i>	234
	<i>Exercise 22.11.3</i>	<i>Drawing Polygons</i>	236
	<i>Exercise 22.11.4</i>	<i>Drawing a Star</i>	237
	<i>Exercise 22.11.5</i>	<i>Drawing Random Stars at Random Positions</i>	238
	<i>Exercise 22.11.6</i>	<i>Using Decision Structures to Draw Stars</i>	240
22.12	REVIEW EXERCISES		241
CHAPTER 23	DATA STRUCTURES IN C#		245
23.1	INTRODUCTION TO DATA STRUCTURES		245
23.2	WHAT IS AN ARRAY?.....		246
	<i>Exercise 23.2.1</i>	<i>Designing a Data Structure</i>	246
	<i>Exercise 23.2.2</i>	<i>Designing Data Structures</i>	247
23.3	CREATING ARRAYS IN C#.....		248
23.4	HOW TO GET A VALUE FROM AN ARRAY.....		249
	<i>Exercise 23.4.1</i>	<i>Find What is Displayed</i>	249
	<i>Exercise 23.4.2</i>	<i>Using a Non-Existing Index in Arrays</i>	250
23.5	HOW TO ALTER THE VALUE OF AN ARRAY ELEMENT		251
23.6	HOW TO ITERATE THROUGH AN ARRAY		251
	<i>Exercise 23.6.1</i>	<i>Finding the Sum</i>	253
23.7	HOW TO ADD USER-ENTERED VALUES TO AN ARRAY		254
	<i>Exercise 23.7.1</i>	<i>Displaying Words in Reverse Order</i>	254
	<i>Exercise 23.7.2</i>	<i>Displaying Positive Numbers in Reverse Order</i>	255
	<i>Exercise 23.7.3</i>	<i>Finding the Average Value</i>	255
	<i>Exercise 23.7.4</i>	<i>Displaying Reals Only</i>	257
	<i>Exercise 23.7.5</i>	<i>Displaying Elements with Odd-Numbered Indexes</i>	257
23.8	WHAT IS A DICTIONARY?		258
23.9	CREATING DICTIONARIES IN C#		258
23.10	HOW TO GET A VALUE FROM A DICTIONARY		260
	<i>Exercise 23.10.1</i>	<i>Using a Non-Existing Key in Dictionaries</i>	260
23.11	HOW TO ALTER THE VALUE OF A DICTIONARY ELEMENT		260
	<i>Exercise 23.11.1</i>	<i>Assigning a Value to a Non-Existing Key</i>	261
23.12	HOW TO ITERATE THROUGH A DICTIONARY.....		261
23.13	USEFUL ARRAY METHODS (SUBPROGRAMS), AND MORE		263
23.14	REVIEW QUESTIONS: TRUE/FALSE		265

23.15	REVIEW QUESTIONS: MULTIPLE CHOICE.....	269
23.16	REVIEW EXERCISES.....	273
23.17	REVIEW QUESTIONS.....	276
CHAPTER 24	MORE EXERCISES WITH DATA STRUCTURES	277
24.1	SIMPLE EXERCISES WITH DATA STRUCTURES.....	277
	<i>Exercise 24.1.1</i> <i>Creating an Array with the Greatest Values.....</i>	277
	<i>Exercise 24.1.2</i> <i>On Which Days Was There a Possibility of Snow?.....</i>	278
	<i>Exercise 24.1.3</i> <i>Was There Any Possibility of Snow?.....</i>	278
24.2	HOW TO USE MORE THAN ONE DATA STRUCTURES IN A PROGRAM.....	280
	<i>Exercise 24.2.1</i> <i>Finding the Average Value.....</i>	280
	<i>Exercise 24.2.2</i> <i>Using an Array Along with a Dictionary.....</i>	282
24.3	FINDING MINIMUM AND MAXIMUM VALUES IN ARRAYS.....	283
	<i>Exercise 24.3.1</i> <i>Which Depth is the Greatest?.....</i>	283
	<i>Exercise 24.3.2</i> <i>Which Lake is the Deepest?.....</i>	284
	<i>Exercise 24.3.3</i> <i>Which Lake, in Which Country, Having Which Average Area, is the Deepest?.....</i>	285
	<i>Exercise 24.3.4</i> <i>Which Students are the Shortest?.....</i>	287
24.4	SEARCHING ELEMENTS IN DATA STRUCTURES.....	288
	<i>Exercise 24.4.1</i> <i>Searching in an Array That May Contain the Same Value Multiple Times.....</i>	289
	<i>Exercise 24.4.2</i> <i>Display the Last Names of All Those People Who Have the Same First Name.....</i>	289
	<i>Exercise 24.4.3</i> <i>Searching in a Data Structure that Contains Unique Values.....</i>	290
	<i>Exercise 24.4.4</i> <i>Searching for a Given Social Security Number.....</i>	291
24.5	REVIEW QUESTIONS: TRUE/FALSE.....	292
24.6	REVIEW EXERCISES.....	292
CHAPTER 25	INTRODUCTION TO SUBPROGRAMS.....	295
25.1	WHAT EXACTLY IS A SUBPROGRAM?.....	295
25.2	WHAT IS PROCEDURAL PROGRAMMING?.....	295
25.3	WHAT IS MODULAR PROGRAMMING?.....	296
25.4	REVIEW QUESTIONS: TRUE/FALSE.....	297
25.5	REVIEW QUESTIONS.....	297
CHAPTER 26	USER-DEFINED SUBPROGRAMS.....	299
26.1	SUBPROGRAMS THAT RETURN VALUES.....	299
26.2	HOW TO MAKE A CALL A METHOD.....	300
26.3	SUBPROGRAMS THAT RETURN NO VALUES.....	303
26.4	HOW TO MAKE A CALL TO A VOID METHOD.....	304
26.5	FORMAL AND ACTUAL ARGUMENTS.....	305
26.6	HOW DOES A SUBPROGRAM EXECUTE?.....	306
26.7	CAN TWO SUBPROGRAMS USE VARIABLES OF THE SAME NAME?.....	307
26.8	CAN A SUBPROGRAM CALL ANOTHER SUBPROGRAM?.....	308
26.9	DEFAULT ARGUMENT VALUES (OPTIONAL ARGUMENTS) AND NAMED ARGUMENTS.....	309
26.10	THE SCOPE OF A VARIABLE.....	310
26.11	REVIEW QUESTIONS: TRUE/FALSE.....	312
26.12	REVIEW EXERCISES.....	314
26.13	REVIEW QUESTIONS.....	315
CHAPTER 27	MORE EXERCISES WITH SUBPROGRAMS	317
27.1	SOME MORE EXERCISES FOR EXTRA PRACTICE.....	317
	<i>Exercise 27.1.1</i> <i>Back to Basics – Calculating the Sum of Two Numbers.....</i>	317
	<i>Exercise 27.1.2</i> <i>Calculating the Sum of Two Numbers Using Fewer Lines of Code!.....</i>	317
	<i>Exercise 27.1.3</i> <i>A Simple Currency Converter.....</i>	318
	<i>Exercise 27.1.4</i> <i>A More Complete Currency Converter.....</i>	319
	<i>Exercise 27.1.5</i> <i>Finding the Average Values of Positive Integers.....</i>	321
	<i>Exercise 27.1.6</i> <i>Roll, Roll, Roll the... Dice!.....</i>	323
27.2	REVIEW EXERCISES.....	324
CHAPTER 28	OBJECT-ORIENTED PROGRAMMING	327

28.1	WHAT IS OBJECT-ORIENTED PROGRAMMING?	327
28.2	CLASSES AND OBJECTS IN C#	328
28.3	THE CONSTRUCTOR AND THE KEYWORD THIS	330
28.4	PASSING INITIAL VALUES TO THE CONSTRUCTOR	332
	<i>Exercise 28.4.1 Historical Events</i>	333
28.5	GETTER AND SETTER METHODS VS PROPERTIES	334
	<i>Exercise 28.5.1 The Roman Numerals</i>	339
28.6	CAN A METHOD CALL ANOTHER METHOD OF THE SAME CLASS?	342
	<i>Exercise 28.6.1 Doing Math</i>	342
28.7	CLASS INHERITANCE	343
28.8	REVIEW QUESTIONS: TRUE/FALSE	347
28.9	REVIEW EXERCISES	348
28.10	REVIEW QUESTIONS	352
CHAPTER 29	FILES	353
29.1	INTRODUCTION	353
29.2	OPENING A FILE	353
29.3	CLOSING A FILE	354
29.4	WRITING TO A FILE	355
29.5	READING FROM A FILE	357
29.6	ITERATING THROUGH THE CONTENTS OF A FILE	358
29.7	REVIEW QUESTIONS: TRUE/FALSE	359
29.8	REVIEW EXERCISES	361
29.9	REVIEW QUESTIONS	362
CHAPTER 30	MORE EXERCISES WITH FILES	363
30.1	SOME MORE EXERCISES FOR EXTRA PRACTICE	363
	<i>Exercise 30.1.1 Calculating the Sum of 10 Numbers</i>	363
	<i>Exercise 30.1.2 Calculating the Average Value of an Unknown Quantity of Numbers</i>	363
	<i>Exercise 30.1.3 Finding Minimum and Maximum Values</i>	364
	<i>Exercise 30.1.4 Concatenating Files</i>	365
	<i>Exercise 30.1.5 Searching in a File</i>	367
	<i>Exercise 30.1.6 Combining Files with Subprograms</i>	368
30.2	REVIEW EXERCISES	369
SOME FINAL WORDS FROM THE AUTHOR		373
INDEX.....		375
SOME OF MY BOOKS.....		379