

# Contents

	Preface	V
	Introduction	1
1	The Gamma Function	4
	Exercises	9
2	Hypergeometric Identities	11
	$q$ -Hypergeometric Identities	24
	Exercises	26
3	Hypergeometric Database	31
	$q$ -Hypergeometric Database	40
	Exercises	41
4	Holonomic Recurrence Equations	44
	Multiple Summation	53
	$q$ -Holonomic Recurrence Equations	55
	Exercises	57
5	Gosper's Algorithm	61
	Linearization of Gosper's Algorithm	74
	$q$ -Gosper Algorithm	74
	Exercises	75
6	The Wilf-Zeilberger Method	80
	$q$ -WZ method	90
	Exercises	90
7	Zeilberger's Algorithm	93
	$q$ -Zeilberger Algorithm	113
	Exercises	113
8	Extensions of the Algorithms	124
	Exercises	137

<b>9</b>	<b>Petkovšek's Algorithm</b>	<b>140</b>
	$q$ -Petkovšek Algorithm	157
	Exercises	158
<b>10</b>	<b>Differential Equations for Sums</b>	<b>164</b>
	$q$ -Differential Equations for Sums	176
	Exercises	178
<b>11</b>	<b>Hyperexponential Antiderivatives</b>	<b>183</b>
	Exercises	192
<b>12</b>	<b>Holonomic Equations for Integrals</b>	<b>194</b>
	Exercises	203
<b>13</b>	<b>Rodrigues Formulas and Generating Functions</b>	<b>207</b>
	Exercises	211
	Appendix: Installation of the Software	214
	Bibliography	216
	List of Symbols	224
	Index	225