

Contents

Preface	vii
1 Basic properties of polynomials - Part I	1
1.1 Identities	2
1.2 The coefficients of x^d in polynomial products	6
1.3 Factoring and its implications	11
1.4 Values of polynomials	18
1.5 Division, GCD of polynomials	26
1.6 The composition of polynomials	35
1.7 Odd and even polynomials	37
2 Basic properties of polynomials - Part II	39
2.1 Polynomial roots	39
2.2 Integer and rational roots of polynomials	44
2.3 Intermediate value theorem, increasing and decreasing polynomials	49
3 Second degree polynomials	59
3.1 The form $ax^2 + bx + c$	59
3.2 The discriminant	61
3.3 Roots	66
3.4 Vieta's formulas	73
3.5 Solving inequalities	75
3.6 Miscellaneous problems	78
3.7 More advanced problems	80
4 Third degree polynomials	85
4.1 Roots and graph	85
4.2 Vieta's formulas	90
4.3 More advanced problems	93
5 Fourth degree polynomials	101
5.1 Solving equations	101
5.2 Vieta's formulas	101
5.3 Number of real roots and graph	104
5.4 Miscellaneous	107
6 On roots of polynomials - elementary problems	111

6.1	Vieta's formulas in the general case	111
6.2	Inequalities between coefficients and roots	115
6.3	Miscellaneous problems	121
7	Number theory and polynomials	125
7.1	Number theory and low degree polynomials	125
7.2	$P(a) - P(b)$	127
8	Introductory problems	135
9	Advanced problems	145
10	Solutions to introductory problems	155
11	Solutions to advanced problems	197
12	Other Books from XYZ Press	261