

Lectures on Challenging Mathematics

UC2M1

Invitation to Computational Mathematics Part 2, Modulo 1

Spring 2015

Zuming Feng

Phillips Exeter Academy and IDEA Math
zfeng@exeter.edu

©Copyright 2008 – 2014 Idea Math

Copyright © 2008 – 2016 IDEA MATH.

“Cogito ergo Sum” – “I think, therefore I am”

René Descartes (1596-1650)

©Copyright 2008 – 2014 Idea Math

Idea Math
Internal Use

Contents

©Copyright 2008 – 2014 Idea Math

Algebra	1
1.1 Squares and cubes and their sums and differences (part 1)	1
1.1.1 Simple Algebra with 3-variable polynomials	1
1.1.2 Mixed exercises	1
1.2 Revisit quadratic formula (part 1)	3
1.2.1 Revisiting quadratic formula (part 1)	3
1.2.2 Quadratic inequalities	4
1.3 Magnitudes of numbers (part 1)	5
1.3.1 Graphs of absolute value functions (part 4)	5
1.3.2 Magnitudes of numbers (part 4)	5
1.4 Squares and cubes and their sums and differences (part 2)	6
1.5 Revisit quadratic formula (part 2)	7
1.5.1 Revisiting quadratic formula (part 2)	7
1.5.2 Revisiting absolute value functions (part 2)	7
1.6 Magnitudes of numbers (part 2)	8
1.6.1 Graphs of absolute value functions (part 5)	8
1.6.2 Magnitudes of numbers (part 5)	8
1.7 Squares and cubes and their sums and differences (part 3)	9
1.8 Algebra practices	10
1.8.1 Practice with exponents	10
1.8.2 Completing the square	10
1.8.3 Sums and products	10
1.9 Operations rules with logarithm (part 1)	12
1.9.1 Operations rules with logarithm (part 1)	12
1.9.2 Practice with algebra and number sense	13
1.10 Arithmetic and geometric progressions	14
1.11 Operations rules with logarithm (part 2)	16
1.12 Rational expressions (part 1)	19
1.13 Algebra 1.1	20
1.14 Infinite geometric series	21
1.14.1 Infinite geometric series	21
1.14.2 Bouncing balls	21

1.15	Algebra 1.2	23
1.16	Practices with geometric series	24
1.17	Algebra 1.3	25
1.18	The discriminant of the quadratic function	26
1.19	Algebra 1.4	27
1.20	Rational expressions (part 2)	28
1.21	Algebra 1.5	30
1.22	Recursive relations	31
1.23	Algebra 1.6	34
	Number Theory	35
2.1	Divisibility criteria and digits in the decimal system	35
2.1.1	Divisibility criteria and digits in the decimal system	35
2.1.2	Computations with divisors	36
2.2	Number sense quickies	37