

# Contents

<b>I Review</b>	<b>1</b>
<b>1 MOD Basic</b>	<b>3</b>
1.1 MOD Basic . . . . .	3
1.1.1 Definition . . . . .	3
1.1.2 Residue Class and Residue System . . . . .	4
1.2 MOD Operations . . . . .	4
1.2.1 Basic Properties . . . . .	4
1.2.2 Modular Multiplicative Inverse . . . . .	5
1.3 The Negative One Method . . . . .	6
1.4 Sum of Digits (The MOD 9 Technique) . . . . .	7
1.5 Finding Ending Digit(s) . . . . .	8
1.5.1 Finding the Units Digit . . . . .	8
1.5.2 Finding the Last $k$ Digits . . . . .	9
1.5.3 A Quick Way to Find the Tens Digit of $m^n$ .	10
1.5.4 Useful Facts . . . . .	13
1.6 Square Numbers . . . . .	13
1.6.1 MOD Properties . . . . .	13
1.6.2 Sum of Squares . . . . .	14
<b>2 Important Theorems</b>	<b>17</b>
2.1 Fermat Little Theorem . . . . .	17
2.2 Euler's Totient Function . . . . .	18
2.3 Euler's Theorem . . . . .	19
2.4 Multiplicative Order . . . . .	21
2.5 Wilson's Theorem . . . . .	22
<b>3 MOD Equation</b>	<b>23</b>
3.1 MOD Equation Basics . . . . .	23

## CONTENTS

---

3.2 Solving $ax \equiv b \pmod{m}$ . . . . .	25
3.3 Chinese Remainder Theorem (CRT) . . . . .	26
<b>II Practice</b>	<b>29</b>
<b>III Solution</b>	<b>69</b>