

Table of Contents

Abstract	iii
Acknowledgements	vi
Table of Contents	vii
1 Introduction	1
1.1 Partitions	1
1.2 ℓ -regular partition function	1
1.3 2-color partition function	3
1.4 t -cores	5
1.5 Broken k -diamond partitions	7
1.6 k dots bracelet partitions	10
1.7 Singular overpartitions	14
1.8 t -dissection and Ramanujan's theta functions	16
2 New congruences for ℓ-regular partitions for $\ell \in \{5, 6, 7, 49\}$	18
2.1 Introduction	18
2.2 Preliminary lemmas	19
2.3 New congruences for 5-regular partitions	23
2.4 New congruences for 6-regular partitions	27
2.5 New congruences for 7- and 49-regular partitions	28
2.6 Proofs of Theorem 1.2.1 and Theorem 1.2.3	32
2.7 Table of congruences for ℓ -regular partitions found in the literature	35

3	New congruences modulo 5 for the number of 2-color partitions	37
3.1	Introduction	37
3.2	Preliminaries	37
3.3	Proof of Theorem 1.3.1 for $k \in \{2, 3, 4\}$	39
4	Parity results for broken 5-, 7- and 11-diamond partitions	49
4.1	Introduction	49
4.2	Preliminary Lemmas	49
4.3	Parity results for broken 5-diamond partitions	50
4.4	Parity results for broken 7-diamond partitions	56
4.5	Parity results for broken 11-diamond partitions	61
5	Congruences modulo p^2 and p^3 for k dots bracelet partition functions	64
5.1	Introduction	64
5.2	Preliminary Lemmas	64
5.3	Congruences modulo p^2 and p^3 for k dots bracelet partitions	66
5.4	Parity results for 7 and 11 dots bracelet partitions	69
5.5	Congruences for 3- and 5-cores	73
6	New congruences for Andrews' singular overpartitions	79
6.1	Introduction	79
6.2	Congruences modulo 4, 18 and 36 for $\overline{C}_{3,1}(n)$	82
6.3	Congruences modulo 2 and 4 for $\overline{C}_{8,2}(n)$	88
6.4	Congruences modulo 2 and 3 for $\overline{C}_{12,2}(n)$ and $\overline{C}_{12,4}(n)$	91
6.5	Congruences modulo 10 for $\overline{C}_{15,5}(n)$	95
6.6	Congruences modulo 2 for $\overline{C}_{24,8}(n)$ and $\overline{C}_{48,16}(n)$	97
	Bibliography	99