

Table of Contents

Chapter I	Conventions and Auxiliary Results	1
Chapter II	Intersection and Diametric Problems	9
Lecture 1	The Complete Intersection Theorem	9
Lecture 2	The Diametric Problem for Vertices in the Hamming Metric	18
Lecture 3	The Diametric Problem for Vertices in the Taxi Metric	30
Lecture 4	The Diametric Problem for Edges in Hamming Metric	41
Lecture 5	Words with Pairwise Common Letter	49
§1	Asymptotical Behavior of g_q^n	50
Lecture 6	Constant Distance Code Pairs	52
§1	The Exact Value of $M_q(n, \delta)$	52
§2	Four-Words Property	64
Chapter III	Covering, Packing, and List Codes	73
Lecture 7	Covering and Packing of Hypergraphs	73
Lecture 8	Covering of Products of Graphs and Hypergraphs	83
Lecture 9	Multiple Packing	89
§1	A Lower Bound	91
§2	An Upper Bound for $R_{q,L}(\rho)$	94
§3	An Upper Bound for $R_{q,L}(\tau)$	98

Lecture 10	List Decoding	105
§1	The Exponent of List-of- L Decoding Error Probability at Zero Rate	109
§2	The Expurgation Bound	118
Chapter IV Higher Level and Dimension Constrained Extremal Problems		125
Lecture 11	Higher Level Extremal Problems	125
§1	The Asymptotics of the Numbers $D_n(\exists, \forall, k)$, $D_n(\forall, \exists, k)$ and $D_n(\exists, \exists, k)$	126
§2	Other Cases of Higher Level Extremal Problems	129
Lecture 12	Properties of Binary Sequences Over Reals	135
§1	The Size of Positive Linear Combinations Free Sets	136
§2	The Unit Cube in the Euclidean Space	140
§3	k -Dimensional Sets of Binary Vectors of Given Weight	141
Chapter V LYM-Related AZ-Identities, Antichain Splittings and Correlation Inequalities		151
Lecture 13	LYM-Type Relations	151
§1	The AZ-Identity and Related Results	152
Lecture 14	The Splitting Property	158
§1	Antichains that Satisfy the Splitting Condition	159
Lecture 15	Correlation Inequalities	160
§1	AD Inequality	162
§2	Other Boolean Operations	168
§3	Arithmetical Operations	171
§4	Implications for Order Extensions and Random Permutations	173
§5	General Correlation Inequalities: Methods for Proving Them	175
§6	Number Theoretical Correlation Inequalities	182
Chapter VI Basic Problems from Combinatorial Number Theory		199
Lecture 16	Solutions of Problems of P. Erdős	199
§1	Definitions, Formulation of Problems, and Conjectures	199
§2	Auxiliary Results: New Combinatorial and Known Number Theoretical Properties	200
§3	Maximal Sets Without $k + 1$ Coprimes	205
§4	Proof of the Main Result	208
§5	Maximal Sets Without Coprimes	217
§6	Counterexamples for Small n	222

Table of Contents	xiii
Appendix	225
References	291
Index	307
List of Symbols	311