Contents

List of definitions and notations — XIII

Preface —— XIX		
§ 190	On p -groups containing a subgroup of maximal class and index p — 1	
§ 191	p-groups G all of whose nonnormal subgroups contain G' in its normal closure —— 4	
§ 192	<i>p</i> -groups with all subgroups isomorphic to quotient groups — 7	
§ 193	Classification of p -groups all of whose proper subgroups are s -self-dual —— 15	
§ 194	<i>p</i> -groups all of whose maximal subgroups, except one, are <i>s</i> -self-dual —— 30	
§ 195	Nonabelian p -groups all of whose subgroups are q -self-dual —— 33	
§ 196	A p-group with absolutely regular normalizer of some subgroup —— 40	
§ 197	Minimal non- <i>q</i> -self-dual 2-groups —— 43	
§ 198	Nonmetacyclic p -groups with metacyclic centralizer of an element of order p —— 52	
§ 199	p-groups with minimal nonabelian closures of all nonnormal abelian subgroups —— 56	
§ 200	The nonexistence of p -groups G all of whose minimal nonabelian subgroups intersect $Z(G)$ trivially —— 61	
§ 201	Subgroups of order p^p and exponent p in p -groups with an irregular subgroup of maximal class and index $> p$ —— 64	
§ 202	p -groups all of whose \mathcal{A}_2 -subgroups are metacyclic —— 67	
§ 203	Nonabelian p -groups G in which the center of each nonabelian subgroup is contained in $\mathbf{Z}(G)$ —— 71	

- § 204 Theorem of R. van der Waal on p-groups with cyclic derived subgroup, p > 2 73
- § 205 Maximal subgroups of A_2 -groups 75
- § 206 *p*-groups all of whose minimal nonabelian subgroups are pairwise nonisomorphic —— 90
- § 207 Metacyclic groups of exponent p^e with a normal cyclic subgroup of order $p^e 94$
- § 208 Non-Dedekindian *p*-groups all of whose nonnormal maximal cyclic subgroups are maximal abelian —— 99
- § 209 p-groups with many minimal nonabelian subgroups, 3 101
- § 210 A generalization of Dedekindian groups —— 103
- § 211 Nonabelian *p*-groups generated by the centers of their maximal subgroups —— 108
- § 212 Nonabelian p-groups generated by any two nonconjugate maximal abelian subgroups —— 110
- § 213 p-groups with $A \cap B$ being maximal in A or B for any two nonincident subgroups A and $B \longrightarrow 112$
- § 214 Nonabelian p-groups with a small number of normal subgroups —— 117
- § 215 Every p-group of maximal class and order $\geq p^p$, p > 3, has exactly p two-generator nonabelian subgroups of index p 120
- § 216 On the theorem of Mann about *p*-groups all of whose nonnormal subgroups are elementary abelian —— 122
- § 217 Nonabelian p-groups all of whose elements contained in any minimal nonabelian subgroup are of breadth < 2 129
- § 218 A nonabelian two-generator *p*-group in which any nonabelian epimorphic image has the cyclic center —— 130

§ 219	class — 132
§ 220	On metacyclic <i>p</i> -groups and close to them —— 136
§ 221	Non-Dedekindian p -groups in which normal closures of nonnormal abelian subgroups have cyclic centers —— 141
§ 222	Characterization of Dedekindian <i>p</i> -groups, 2 —— 143
§ 223	Non-Dedekindian p -groups in which the normal closure of any nonnormal cyclic subgroup is nonabelian —— 147
§ 224	<i>p</i> -groups in which the normal closure of any cyclic subgroup is abelian —— 154
§ 225	Nonabelian p -groups in which any s (a fixed $s \in \{3, \ldots, p+1\}$) pairwise noncommuting elements generate a group of maximal class — 156
§ 226	Noncyclic <i>p</i> -groups containing only one proper normal subgroup of a given order —— 158
§ 227	p-groups all of whose minimal nonabelian subgroups have cyclic centralizers —— 161
§ 228	Properties of metahamiltonian <i>p</i> -groups —— 163
§ 229	<i>p</i> -groups all of whose cyclic subgroups of order $\geq p^3$ are normal —— 170
§ 230	Nonabelian p -groups of exponent p^e all of whose cyclic subgroups of order p^e are normal —— 179
§ 231	<i>p</i> -groups which are not generated by their nonnormal subgroups —— 185
§ 232	Nonabelian p -groups in which any nonabelian subgroup contains its centralizer —— 191
§ 233	On monotone <i>p</i> -groups —— 194
§ 234	<i>p</i> -groups all of whose maximal nonnormal abelian subgroups are conjugate —— 196

- § 235 On normal subgroups of capable 2-groups —— 197
- § 236 Non-Dedekindian *p*-groups in which the normal closure of any cyclic subgroup has a cyclic center —— 198
- § 237 Noncyclic *p*-groups all of whose nonnormal maximal cyclic subgroups are self-centralizing —— 199
- § 238 Nonabelian *p*-groups all of whose nonabelian subgroups have a cyclic center 200
- § 239 *p*-groups G all of whose cyclic subgroups are either contained in Z(G) or avoid Z(G) 202
- § 240 *p*-groups *G* all of whose nonnormal maximal cyclic subgroups are conjugate —— 203
- § 241 Non-Dedekindian p-groups with a normal intersection of any two nonincident subgroups —— 205
- § 242 Non-Dedekindian *p*-groups in which the normal closures of all nonnormal subgroups coincide —— 207
- § 243 Nonabelian p-groups G with $\Phi(H) = H'$ for all nonabelian $H \le G \longrightarrow 210$
- § 244 p-groups in which any two distinct maximal nonnormal subgroups intersect in a subgroup of order $\leq p$ 211
- § 245 On 2-groups saturated by nonabelian Dedekindian subgroups 212
- § 246 Non-Dedekindian p-groups with many normal subgroups —— 226
- § 247 Nonabelian p-groups all of whose metacyclic sections are abelian —— 227
- § 248 Non-Dedekindian p-groups G such that $H^G = HZ(G)$ for all nonnormal $H < G \longrightarrow 228$
- § 249 Nonabelian p-groups G with $A \cap B = Z(G)$ for any two distinct maximal abelian subgroups A and $B \longrightarrow 229$
- § 250 On the number of minimal nonabelian subgroups in a nonabelian *p*-group —— 230

§ 251	<i>p</i> -group	os all of whose minimal nonabelian subgroups are isolated —— 236
§ 252		elian <i>p</i> -groups all of whose maximal abelian subgroups are d —— 242
§ 253	Maxima	al abelian subgroups of <i>p</i> -groups, 2 —— 244
§ 254	On <i>p</i> -gı	roups with many isolated maximal abelian subgroups —— 246
§ 255	Maxima	al abelian subgroups of <i>p</i> -groups, 3 —— 248
§ 256	A probl	em of D. R. Hughes for 3-groups —— 249
Append	lix 58	Alternate proof of Passman's Theorem 1.23 —— 251
Append	lix 59	Iwasawa's theorem on modular <i>p</i> -groups —— 253
Append	lix 60	On p -groups, containing only one noncyclic subgroup of order p^e , $e \geq 3$ —— 255
Append	lix 61	A necessary and sufficient condition for a p -group G to satisfy $\Phi(G) \leq Z(G) -\!$
Append	lix 62	Subgroups of some <i>p</i> -groups —— 259
Append	lix 63	Intersections of nonnormal cyclic subgroups —— 262
Append	lix 64	Some remarks on p -groups all of whose nonnormal subgroups are abelian —— 263
Append	lix 65	On p -groups G with $ \Omega_1(G) = p^n - 264$
Append	lix 66	Metacyclic p -groups containing an abelian subgroup of index p —— 265
Append	lix 67	p -groups in which the intersection of all their subgroups of order p^2 has order p — 267
Append	lix 68	The 2-groups all of whose nonabelian two-generator subgroups are minimal nonabelian —— 270
Append	lix 69	Supplement to Theorem 200.1 —— 272

Appendix 70	Nonabelian p -groups all of whose maximal cyclic subgroups coincide with their centralizers —— 273
Appendix 71	Finite groups G containing a p -subgroup permutable with all Sylow q -subgroups of G for all $q \neq p$ — 274
Appendix 72	Nonabelian p -groups with an abelian subgroup of index p covered by minimal nonabelian subgroups —— 278
Appendix 73	On metacyclic and modular <i>p</i> -groups —— 279
Appendix 74	On p -groups, $p > 2$, without subgroups isomorphic to $S(p^3)$ — 282
Appendix 75	Irregular <i>p</i> -groups with < <i>p</i> absolutely regular subgroups of maximal possible order —— 284
Appendix 76	On a class of <i>p</i> -groups —— 286
Appendix 77	The p -groups, $p > 2$, containing only one subgroup $\cong S(p^3) \longrightarrow 288$
Appendix 78	Further criterion of p -nilpotence and π -nilpotence —— 290
Appendix 79	2-groups G containing a nonabelian metacyclic subgroup H of order 2^{2e} and exponent 2^e such that $N_G(H)$ is metacyclic —— 292
Appendix 80	On minimal nonabelian groups of order 2^{2n} and exponent $2^n - 294$
Appendix 81	On p -groups with a cyclic subgroup of index p^3 — 296
Appendix 82	On nonmodular p -groups all of whose subgroups of order $> p$ are quasinormal —— 298
Appendix 83	Nonabelian regular p -groups of exponent p^e are generated by minimal nonabelian subgroups of exponent p^e —— 300
Appendix 84	Noncyclic 2-groups in which all cyclic subgroups of any equal order $>$ 2 are conjugate —— 302
Appendix 85	On <i>p</i> -groups with given epimorphic images —— 303

Appendix 86	p -groups with nonabelian derived subgroup of order p^4 —— 305
Appendix 87	On the number of epimorphic images of maximal class and a given order of a 2-group —— 306
Appendix 88	Minimal nonabelian p -groups $\not\equiv Q_8$ in which the intersection of all their nonnormal subgroups is $>\{1\}$ —— 310
Appendix 89	Metacyclic 2-groups containing an abelian subgroup of order 2^{2n} and exponent $2^n - 312$
Appendix 90	Two alternate proofs of G. A. Miller's theorem on minimal non-Dedekindian groups and a corollary —— 313
Appendix 91	On a p -group whose proper Hughes subgroup has the Frattini subgroup of order p —— 318
Appendix 92	p -groups all of whose subgroups of order p^p and exponent p are abelian —— 322
Appendix 93	Nonabelian p -groups G with $ G:HC_G(H) \le p$ for all nonabelian subgroups H — 324
Appendix 94	Non-Dedekindian p -groups with exactly one conjugate class of nonnormal maximal cyclic subgroups —— 325
Appendix 95	The centralizer of any element from $G - \Phi(G)$ cannot be a nonabelian two-generator subgroup —— 326
Appendix 96	Nonabelian 2-groups in which any two noncommuting elements generate a subgroup of maximal class —— 328
Appendix 97	p -groups all of whose subgroups of order p^p and exponent p are of maximal class —— 331
Appendix 98	The number of cyclic subgroups of given order in a metacyclic p -group —— 332
Appendix 99	On existence of L _p -subgroups in a <i>p</i> -group —— 335
Appendix 100	Nonabelian p -groups with minimal number of conjugate classes of maximal abelian subgroups —— 337

Appendix 101	Finite p -groups saturated by isolated subgroups —— 339		
Appendix 102	A characterization of minimal nonabelian <i>p</i> -groups —— 347		
Appendix 103	p -groups all of whose subgroups of order p^3 are isomorphic —— 349		
Appendix 104	Alternate proof of the theorem of Janko on nonabelian p -groups all of whose maximal abelian subgroups are isolated —— 351		
Appendix 105	Nonabelian 2-groups generated by an element of order 4 and an involution —— 353		
Appendix 106	Nonabelian 2-groups not covered by proper nonabelian subgroups —— 355		
Appendix 107	Nonabelian p -groups all of whose minimal nonabelian subgroups have the same center —— 357		
Appendix 108	Nonabelian p -groups G in which the center of each nonabelian subgroup is contained in $Z(G)$ — 358		
Appendix 109	O. Schmidt's theorem on groups all of whose nonnormal subgroups are conjugate —— 359		
Research problems and themes V —— 361			
Bibliography —	-391		
Author index —— 405			
Subject index —— 407			