

TABLE OF CONTENTS

1.	<u>Preliminaries from Fourier Analysis and Integration Theory</u>	1
1.1	General Notation and Definitions for Fourier Analysis	1
1.2	Synthesis, Arithmetic, and Uniqueness Sets	6
1.3	Distribution Theory	8
1.4	Properties of $m(\Gamma)$	11
1.5	Approximate Identities	16
2.	<u>Pseudo-Measures Supported by Totally Disconnected Sets</u>	20
2.1	Structure of Totally Disconnected Sets	20
2.2	Measures Associated with Distributions	26
2.3	Representation of First Order Distributions	29
2.4	Measure Theoretic Properties of Pseudo-Measures	40
3.	<u>A Characterization of Uniqueness Sets</u>	46
3.1	Introduction to Uniqueness Sets	46
3.2	Hyperdistributions and Pseudo-Measures	47
3.3	Riemann's Localization Principle	54
3.4	Pseudo-Function Characterization of U-Sets	59
4.	<u>Independent Sets and Arithmetic Progressions</u>	69
4.1	Independent and Kronecker Sets	69
4.2	Examples of Arithmetic Progressions and Independent Sets	73
4.3	Arithmetic Progressions and Non-Helson Sets	80
4.4	Groups Generated by Independent and Symmetric Sets	87
5.	<u>Kronecker's Theorem and Kronecker Sets</u>	93
5.1	Dirichlet's Theorem and Statements of Kronecker's Theorem	93
5.2	The Bohr Proof of Kronecker's Theorem and Related Estimates ..	103
5.3	Infinite Kronecker Sets	112
5.4	Wik Sets	120
6.	<u>Independent Sets of Multiplicity</u>	124
6.1	Introduction	124

6.2	Salem's Theorem.....	124
6.3	The Existence of Rudin Sets	134
7.	<u>Helson Sets</u>	141
7.1	Equivalent Definitions of Helson Sets	141
7.2	Arithmetic Properties of Helson Sets	141
7.3	Uniqueness Properties of Helson Sets	149
7.4	Further Functional Analysis Criteria for Helson Sets.....	152
8.	<u>Concluding Remarks</u>	159
A.	<u>The Wiener Process</u>	161
A.1	Probability Spaces and Expectation of Random Variables.....	161
A.2	Independent Events	165
A.3	$e^{-c^2x^2}$	169
A.4	Gaussian Variables	172
A.5	The Hilbert Space of Gaussian Variables	177
A.6	Homogeneous Chaos	179
A.7	The Wiener Process	182
A.8	Equivalence of the Wiener Process and Homogeneous Chaos.....	184
A.9	Wiener Measure.....	188
A.10	Salem-Zygmund Inequality	192
A.11	Continuity and Non-Differentiability a.e. of the Wiener Process	199
B.	<u>Malliavin's Theorem</u>	207
B.1	Malliavin's Idea.....	207
B.2	Construction of a Non-Spectral Function	214
B.3	The Schwartz Example	223
B.4	Tensor Algebras	229
B.5	Varopoulos' Proof	239
	<u>Bibliography</u>	251
	<u>Index</u>	260