

CHAPTER I



INTRODUCTION

The purpose of this thesis is to construct in a systematic way sequences of zeros and ones (or binary digits) that shall be nearly or perfectly random to any specified order. Roughly speaking a sequence is random to order n when the probability of encountering a specified string of n binary digits starting at an arbitrary point in the sequence is the same for all the different possible strings.

The method is to combine periodic sequences of binary digits using a Boolean form of addition, and by studying examples, to discover and prove theorems and to make conjectures that will help in the construction of the required sequences.

This work is of theoretical interest in studying the apparently random motion of systems produced by combined periodic motions within them.

For example, the random noise in electrical sound equipment may be treated as produced by the combination of electrical oscillations of all frequencies in the circuits. Again, according to the laws of mechanics the motion of gas molecules in a box is periodic, but because of the large number of molecules the period is so great and the system is so complicated that the motion appears to be random.