

## CHAPTER I

### INTRODUCTION

The purpose of this thesis is to show the use of functional analysis by applying the Hahn Banach theorem to prove the Ville theorem which is useful in game theory (the basic concepts of game theory can be found in [6], [9], [11]). This theorem shows that, in two person, zero sum game if for each mixed strategy chosen by player II, player I can choose a mixed strategy to make him win, then player I can always choose a fixed mixed strategy which beats player II's whatever that strategy (chosen by player II) would be.

In chapter II, some preliminary concepts on topological vector space, function of bounded variation and measure theory are given.

In chapter III of this thesis concerns the Hahn Banach theorem and its applications.

In chapter IV, Ville theorem for a finite discrete two person zero sum game is introduced and proved by using the applications of the Hahn Banach theorem. And then, extend this theorem to a finite discrete more than two person, zero sum game.

Finally in chapter V, we deal with Ville theorem for a continuous two person, zero sum game. The spaces of distribution functions on  $[0,1]$  that we consider in pairs, according to the Ville theorem are as follows: space of bounded Borel measures on  $[0,1]$  vs. space of bounded Borel measures on  $[0,1]$ , space of bounded variation functions on  $[0,1]$  vs. space of bounded variation functions on  $[0,1]$ , space of bounded variation functions on  $[0,1]$  vs. space of bounded Borel measures on  $[0,1]$ .