Political Science 352

Fall 2002

Handout 1, Some Definitions

Cartesian products

Def$^{\underline{n}}$: The *cartesian product* of two sets A and B, which is denoted $A \times B$, is the set of all pairs such the first element in each pair is a member of A and the second is a member of B.

e.g.: Let A ={ham, turkey} and B = {white, wheat, rye}. What is the new set $A \times B$?

$A \times B$ = {(ham, white), (ham, wheat), (ham, rye), (turkey, white), (turkey, wheat), (turkey, rye)}.

Elements of a finite extensive form game

1. actions
2. choice nodes
3. players assigned to choice nodes
4. information sets (sets of choice nodes)
5. terminal nodes
6. payoffs assigned to terminal nodes

Some restrictions (rules) for what an extensive form game can look like.

1. There must be a unique path to every node.
2. No loops.
3. Restrictions on information sets:
   (a) Each info set includes choice nodes belonging to at most one player.
   (b) Same actions at every choice node in same info set.
   (c) Perfect recall.

Def$^{\underline{\text{n}}}$: A *singleton information set* contains only one choice node.

Def$^{\underline{\text{n}}}$: In a *game of perfect information*, all information sets are singletons. In a game of *imperfect information*, at least one information set contains more than one choice node.

Complete strategies

Def$^{\underline{\text{n}}}$: A *pure strategy in an extensive form game* assigns an action for every information set a player has. [THIS IS VERY IMPORTANT TO UNDERSTAND!!]

Relationship between the normal and extensive form

Consider an extensive form game with n players. Let S_i be the set of *complete* strategies in the game for player i. Then $S = S_1 \times S_2 \times S_3 \ldots \times S_n$ is the set of outcomes in the associated normal form game.[1]

Claim: Every extensive form game has a unique normal form representation.

[1] This is more compactly written $S = \times_{i=1}^{n} S_i$.