Question 32 - Backward Induction

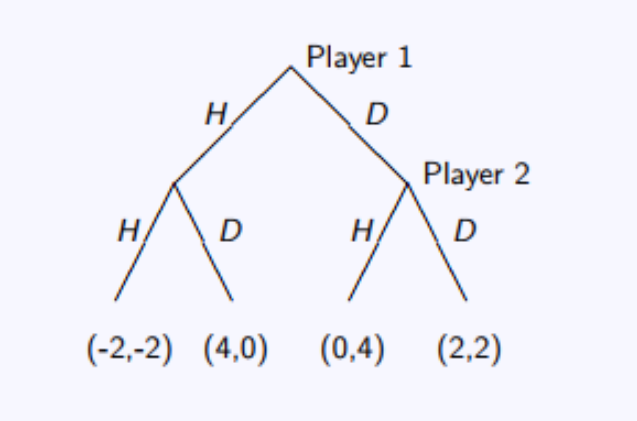

Figure 1:

- Suppose Player 1 has played H. Player 2 obtains -2 by playing H and 0 by playing D. Hence, his best response to H is to play D.
- Suppose Player 1 has played D. Player 2 obtains 4 by playing H and 2 by playing D. Hence, his best response to D is H.
- Now we consider the action of Player 1.
  - If she plays H, then Player 2 will respond by playing D. Player 1 obtains a reward of 4.
  - If she plays D, then Player 2 will respond by playing H. Player 1 obtains a reward of 0.
- It follows that Player 1 should play H. Player 2 follows by playing D.
- The value of the game is (4, 0)

Question 32 - Translation to Extensive Form

- Since Player 1 has 2 strategies and Player 2 has 4 strategies, the payoff matrix will be of dimension 2 4.
  - Player 1 can play H or D.
  - Player 2 can play $(H|H, H|D)$, $(H|H, D|D)$, $(D|H, D|D)$ or $(D|H, H|D)$.

$(H\|H, H\|D)$	Always be Hawk
$(H\|H, D\|D)$	Always do same as player 1
$(D\|H, D\|D)$	Always be Dove
$(D\|H, H\|D)$	Alway do opposite as player 1

We now consider the payoff vectors associated with each strategy pair.

- Suppose Player 1 plays H.
  (a) If Player 2 plays $(H|H, H|D)$ or $(H|H, D|D)$, (*i.e. always Hawk or alway the same*) then both players take the action H and the resulting payoff vector is (2, 2).
  (b) If Player 2 plays $(D|H, D|D)$ or $(D|H, H|D)$ (*i.e. always Dove or alway the opposite*), then Player 1 takes the action H and Player 2 takes the action D and the resulting payoff vector is (4, 0).
- Now suppose Player 1 plays D.
  (a) If Player 2 plays $(D|H,\ D|D)$ or $(H|H, D|D)$, (*i.e. always Dove or alway the same*) , then both players take the actions D and the resulting payoff vector is (2, 2).
  (b) If Player 2 plays $(H|H, H|D)$ or $(D|H, H|D)$, (*i.e. always Hawk or alway the opposite*), then Player 1 takes the action D and Player 2 takes the action H and the resulting payoff vector is (0, 4).

	$(H\|H, H\|D)$	$(H\|H, D\|D)$	$(D\|H, D\|D)$	$(D\|H, H\|D)$
H	(-2,-2)	(-2,-2)	(4,0)	(4,0)
D	(0,4)	(2,2)	(2,2)	(0,4)

Figure 2: