- NE simultaneous moves, continuous set of actions.
- Games with sep. moves.

**Example**: N.E.

2 firms, profit maximization, quantity choice, simultaneous moves, game only played once.

- Nice profit functions
- Homogeneous product
- Linear demand, marginal costs constant, identical firms.

**Best responses**

**Firm 1**: $\max \pi_1(q_1, q_2)$

**Firm 2**: $\max \pi_2(q_1, q_2)$

**Steps**

- Best responses
- Find solution to 2 eq., 2 unknowns

Solving $\begin{cases} q_1 = b_1(q_2) \\ q_2 = b_2(q_1) \end{cases}$
Games

- Timing or moves
- More players
- Not in this class — Uncertainty
  — Information issues

We will work with perfect information games.
Extensive Form Games

1. Game Tree
   Starting Node
   Other Decision Nodes
   Terminal Nodes
   Branches (Actions)

2. Players

3. Movement Information (Time, Actions)

4. Payoffs at Terminal Nodes

5. Information Structure
   Will work with Perfect Information Games
   (entire history of the game is known to players)

**SUBGAME**: subset of the original Game
one node+ subsequent nodes+ terminal nodes
(includes original game)

**Proper Subgame**: subset that is different to the original game

**SUBGAME PERFECT NASH EQUILIBRIUM (SPNE)**

**Strategy Profile** that is a Nash Equilibrium for Every Subgame

Remark: For Finite Games with Perfect Information the SPNE can be found by working **BACKWARDS**
SPNE:

Player 1: Play B_1
Player 2: Play H_2 if player 1 used H_1 (or at node I)
          Play B_2 if player 1 used B_1 (or at node II)

Outcome: Player 1 plays B_1
          H_2  B_2

Payoff at SPNE outcome: \( \pi_1^* = 10 \)
                        \( \pi_2^* = 5 \)
Example:

SPNE sequential quantity choice

Example face 1 but now
Firm 1 chooses $q_1$, first &
After $q_1$ know, Firm 2
chooses $q_2$.

Firm 1

$\pi_1(q_1, q_2)$

$\pi_2(q_1, q_2)$

Firm 2

$\pi_2(q_1)$

$\pi_2(q_2)$

SPNE

$\pi_1(q_1, q_2)$

$\pi_2(q_1)$

Strategies that are NE for every subgame.

Backwards!
OTHER EXAMPLES

Player 1

Player 2

Firms 1 & 2 choose \( \Phi_1, \Phi_2 \) simultaneously

Government + 2 Firms

Gov. 1

S

NO S

Firms 1 & 2