Recall: Strategy $a_i' \in A_i$ is <u>strictly dominated</u> by $a_i^+ \in A_i$ iff f.a. $a_{-i} \in A_{-i}$:

$$u_i(a_{-i}, a_i^+) > u_i(a_{-i}, a_i').$$

Algorithm: Iterated elimination of dom. strat. (IEDS)

1. If possible, eliminate a dominated strategy of some player (leading to game G'), else terminate.
2. Go to 1.

IEDS can be applied with weak or strong dominance.

Example (strong dominance):

2

1	L	C	R
T	2,0	1,1	4,2
~~M~~	~~1,4~~	~~1,1~~	~~2,3~~
~~B~~	~~1,3~~	~~0,2~~	~~3,0~~

NE of orig. game

[3] dom by T

[1] strictly dom. by T

[4] dom. by R

[2] strictly dom by R

Example (with weak dominance)

	L	R
T	2,1	0,0
M	2,1	1,1
~~B~~	~~0,0~~	~~1,1~~

[1] (M)

[2] (L)

	L	R
~~T~~	~~2,1~~	~~0,0~~
M	2,1	1,1
~~B~~	~~0,0~~	~~1,1~~

[2] (M)

[1] (M)

	L	R
~~T~~	~~2,1~~	~~0,0~~
M	2,1	1,1
B	0,0	1,1

[1] (M)

[2] (R)

two remaining solutions, both with payoff profile (2,1)

Remark: Result of IEDS with weak dominance is not unique (neither in terms of remaining action profiles nor of remaining payoff profiles.)

Lemma: Let G be a strategic game and G' be the game resulting from eliminating <u>one</u> strictly dominated strategy from G. Then the NEs of G are exactly those of G'.

Proof: Let a_i' be the eliminated strategy.

Then ex. a_i^+ s.t. f.a. $a_{-i} \in A_{-i}$:

$$u_i(a_{-i}, a_i') < u_i(a_{-i}, a_i^+) \qquad (1)$$

"$\Rightarrow$": Let a^* be an NE of G. Then

$$u_i(a_{-i}^*, a_i^*) \geq u_i(a_{-i}^*, a_i'') \quad \text{f.a. } a_i'' \in A_i$$

$$\Rightarrow u_i(a_{-i}^*, a_i^*) \geq u_i(a_{-i}^*, a_i^+) \overset{(1)}{>} u_i(a_{-i}^*, a_i')$$

$\Rightarrow a_i^* \neq a_i'$ $\Rightarrow$ NE strategy was not eliminated

$\Rightarrow a^*$ still NE in G'.

"$\Leftarrow$": Let a^* be a NE G'. Then:

- For players $j \neq i$: $a_j^* \in B'(a_{-j}^*) = B(a_{-j}^*)$

(no strategy of player j was eliminated.)

For player i: $u_i(a_{-i}^*, a_i^*) \geq u_i(a_{-i}^*, a_i^+)$ a^* NE in G', a_i^+ in G'!

$$\overset{(1)}{>} u_i(a_{-i}^*, a_i')$$

$\Rightarrow a_i'$ no better response to a_{-i}^* than a_i^* (in G)

$\Rightarrow a_i^* \in B(a_{-i}^*)$ $\Rightarrow a^*$ also NE in G.

$\square$

Corollary: If IEDS with strict dominance results in a unique strategy profile a^*, then a^* is the unique NE of org. game G.

Pro.: Inductive application of previous lemma.

Remark: IEDS with strict dominance does not depend on elimination order.