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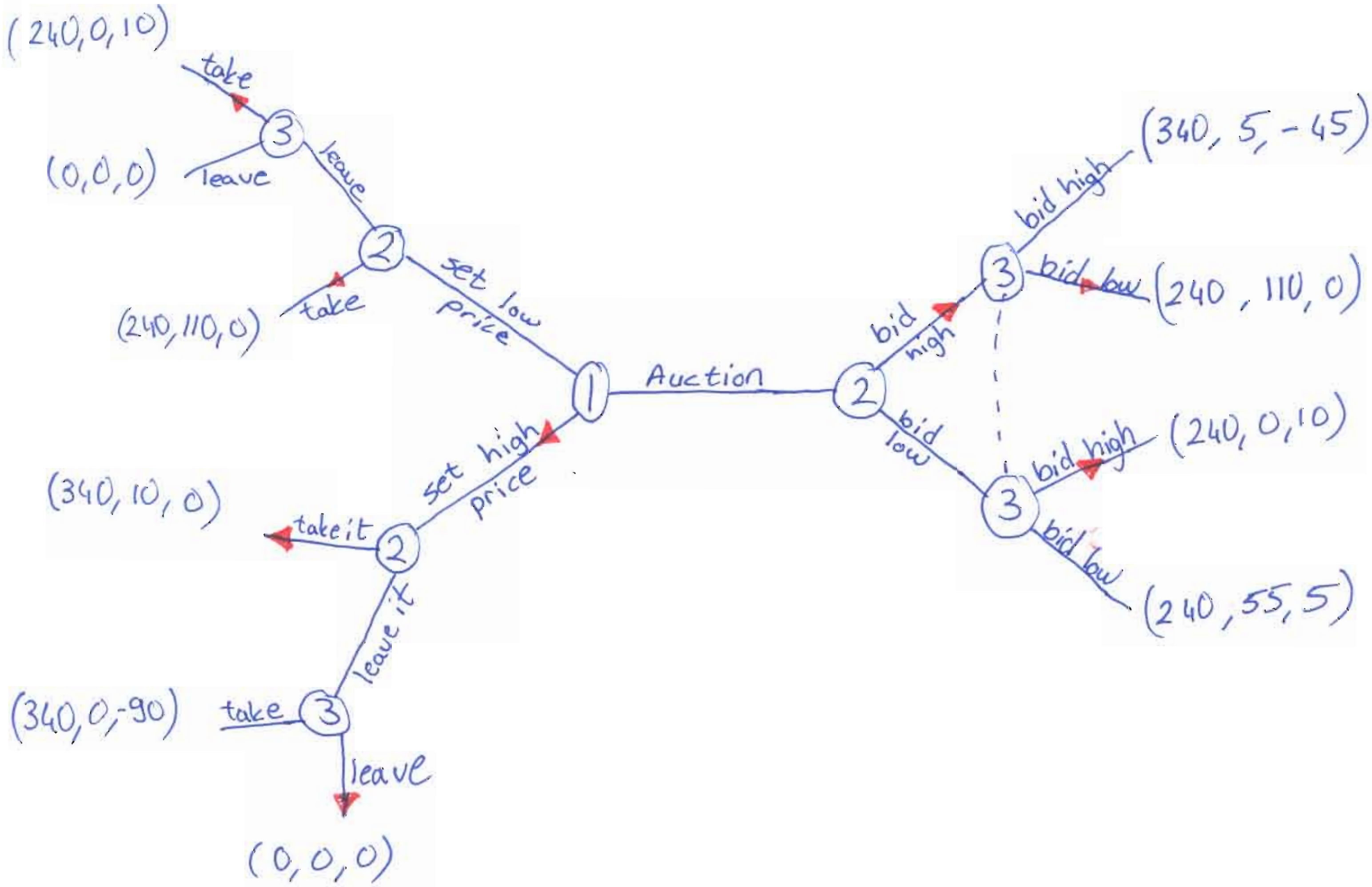
Second Midterm Answers

Econ 401

1) a) Player 1 = seller Player 2 = High-value buyer
Player 3 = low-value buyer



<u>Note</u>: · You could alternatively add 100 to Player 1's payoffs everywhere but you need to be consistent.

· I drew an information set in the auction subgame but I will ignore it in part d. Strictly speaking this is not consistent but you didn't lose points for not drawing the information set.

b)

2 \ 3	H	L
H	5^*, −45	110^*, 0^*
L	0, 10^*	55, 5

c) Only pure strategy NE is (H,L).

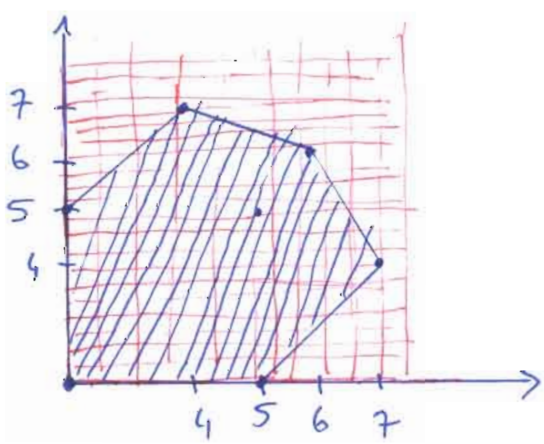
d) By backward induction;

SPE = (Set High Price, tth^*, $tlhl^*$)

See the figure on the previous page for SPE marked by ▶.

$*$: Actions are ordered starting on top left on figure and going counter-clockwise.

2) a)



#: IR set

///: SF set

b) The Folk Theorem says that any point in this set is a subgame perfect equilibrium for δ (discount rate) close enough to 1.

c) Since the game is symmetric the grim trigger strategies are identical for both players.

- Play pat in period (round) 1.
- Play pat as long as you played pat the round before and the other player played pat on the round before.
- Play rat if the other player has played rat or tap before and/or you played rat in the previous round.

d) Notice neither player will deviate to tap from pat. If deviation occurs, it will be to rat (in order to have 7 instead of 6). So for part c) to be NE, the payoff from "pat"ting should be greater than deviating to rat.

$$(1-\delta)(7+5\delta+5\delta^2+\dots) < 6$$

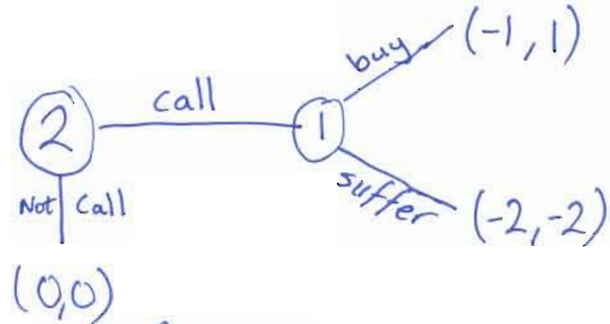
$$(1-\delta)7(5\delta) < 6$$

$$\delta > 1/2$$

e) In every round, each player has the option to defect leading to the static Nash equilibrium (rat, rat) which is subgame perfect. But given $\delta > 1/2$ it is in each players best interest to play "pat" in the final period and all periods before $\Rightarrow$ by backward induction (pat, pat) is SPE.

3)

a)



1 \ 2	C	NC
B	-1*, 1*	0*, 0
S	-2, -2	0*, 0*

b) There are 2 pure strategy NE : (B, C) ; (S, NC)

(B,C) is also SPE.

The stackleberg equilibrium is:

Player 1: commit to suffer

player 2: Not Call

c) We should find δ such that it is optimal for player 1 to play "suffer" forever.

For this to happen, P1 needs to deviate from SPE:

$$(1-\delta)(-2 + 0\delta + 0\delta^2 + \dots) > -1$$

$$2\delta - 2 > -1$$

$$\delta > 1/2$$