Midterm - Gus Lipkin

Friday, October 9, 2020 9:58 AM

1. Draw the extensive form for this game:

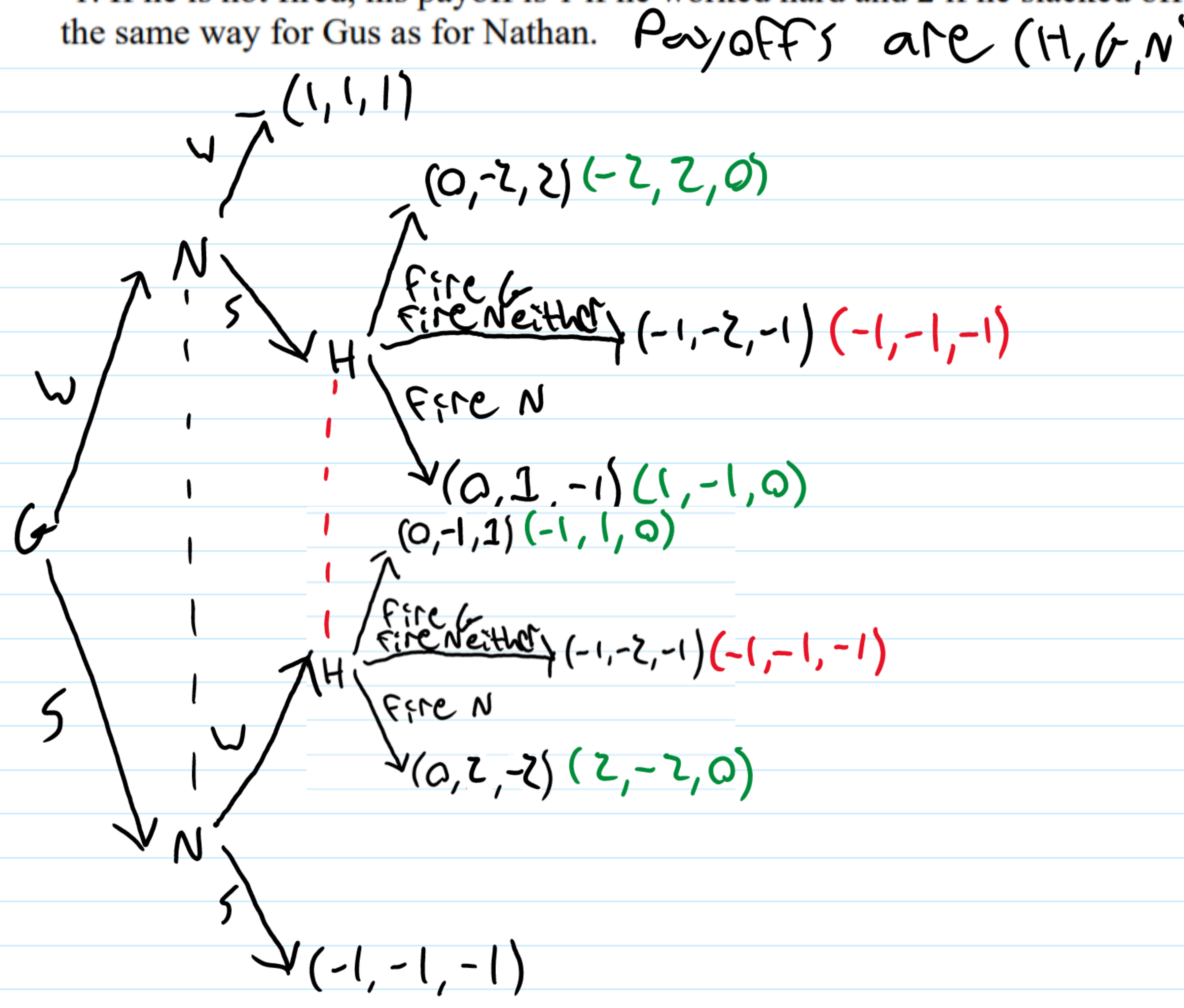
√ Hailey (H) is the supervisor of Gus (G) and Nathan (N). Both Gus and Nathan choose to work hard (W) or slack off (S). Neither Gus not Nathan know if the other worked hard. Hailey can tell if anyone worked or not, but cannot tell who it was if only one does so.

√ If both choose to work hard, the game ends, and all three get a payoff of 1.

√ If both slack off, upper management sees the unit fail, all three get fired, and the game ends with all three receiving a payoff of -1. (You need not make upper management a player in the game—their only role was in determining the rule for payoffs.)

√ If only one works hard, Hailey will see productivity is less than it should be and get a choice. Hailey can fire Nathan or Gus and keep her job, receiving a payoff of 0. If she fires neither, upper management fires the whole team and Hailey receives a payoff of -1.

√ If Nathan is fired, if he worked hard his payoff is -2 and if he did not work hard his payoff is -1. If he is not fired, his payoff is 1 if he worked hard and 2 if he slacked off. Payoffs work the same way for Gus as for Nathan. Payoffs are (H,G,N)



2. For the game below, find the set of rationalizable strategies and any Nash Equilibria.

		Player 1			
		W	X	Y	Z
Player 2	A	~~1, 2~~	~~1, 2~~	~~0, 1~~	0, 1
	B	2, 1	0, 0	3, 4	0, 1
	C	2, 2	2, 3	2, 1	0, 2

0) X+Y dom Z
1) C dom A
2) X+Y dom W

forgot to do iterated dominance

NE are (C,X) and (B,Y)

The NE are (C,W), (C,X), (B,Y), and (0,2)

		Player 1			
		W	X	Y	Z
Player 2	A	~~1, 2~~	~~1, 2~~	~~0, 1~~	[redacted]1
	B	2, 1	0, 0	3, 4	0, 1
	C	2, 2	2, 3	2, 1	0, 2

(2/3 C + 1/3 B, Y) is the rationalizable strategy

rationalizable profiles are {B,C} x {X,Y}

3. Jackson (J) and Nick (N), partners, each decide to work hard or not, without observing the choice of the other. Let H_i be one if player $i \in \{J, N\}$ works hard and 0 otherwise. Payoffs for each are $3(1+H_N+H_J)-4H_i$. Represent the game in normal form. Find the rationalizable strategies and Nash equilibria of this game. Discuss the strategic tensions in the game.

Its not all

Similar to Prisoner's dilemma

J \ N	H	N
H	5,5	(2,6) 6,2
N	2,6 (6,2)	3,3

$HH = 3(1+1+1)-4(1) = 3(3)-4 = 9-4 = 5$

$NN = 3(1+0+0)-4(0) = 3-0 = 3$

$HN = 3(1+1+0)-4(1) = 3(2)-4 = 6-4 = 2$

$NH = 3(1+0+1)-4(0) = 6-0 = 6$

← this mistake carried through

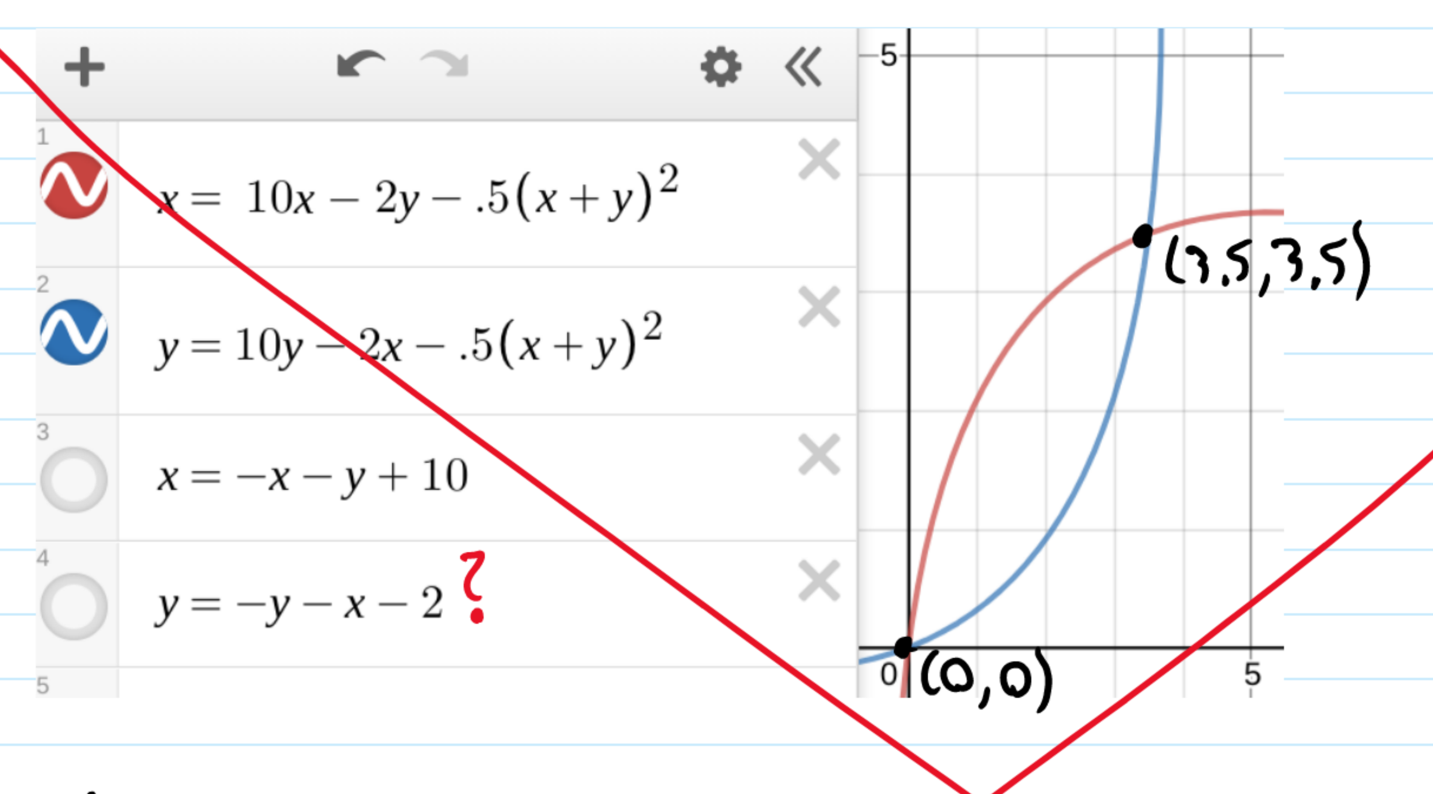
All strategies are rationalizable

(H,H) is the NE (N,N) is NE is strictly dominant

They will get a greater payout if they don't work hard and the other does. But if they both don't work hard, they both get less than if they cooperated & worked hard together.

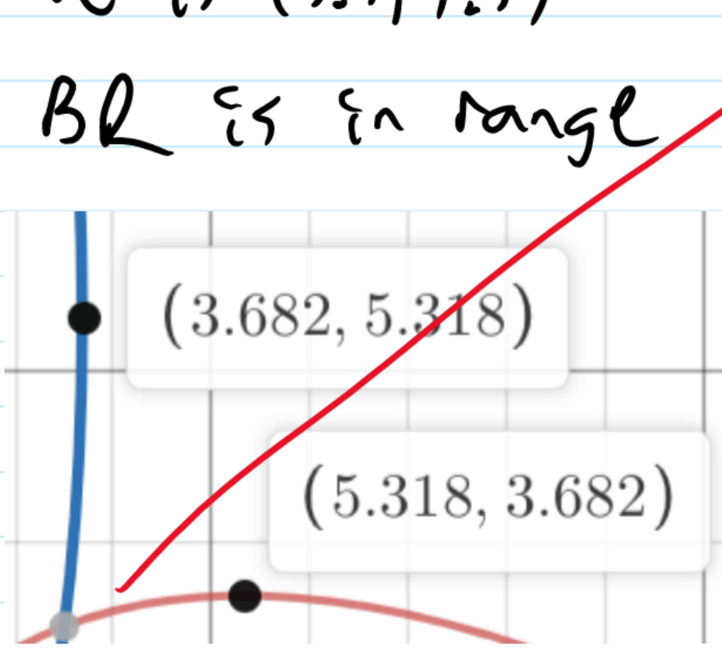
4. Isabel (I) and Raquel (R) each choose how many minutes of air time to purchase to advertise their product, with A_i denoting the number of minutes chosen by player $i \in \{I, R\}$. Isabel's payoff is $10A_I-2A_R-0.5(A_I+A_R)^2$. Raquel's payoffs are similarly defined. Find and graph the best response functions. Find the set of rationalizable strategies and the Nash Equilibria, if any.

messed up variables for R's payoff



NE is (3.5,3.5)

BR is in range



← maximum values for best responses
minimum is 0

$u_I = 10A_I - 2A_R - \frac{1}{2}(A_I + A_R)^2$

$du_I/dA_I = 10 - A_R + A_I = 0 \rightarrow A_I = 10 - A_R$

$u_R = 10A_R - 2A_I - \frac{1}{2}(A_R + A_I)^2$

$du_R/dA_R = 10 - A_R - A_I = 0 \rightarrow A_R = 10 - A_I$

The functions intersect at all values where $A_I + A_R = 10$

[0,10] x [10,0] are rationalizable

All combos that sum to 10 are NE