

EE311 Assignment 7.

Review Question 1 Nash equilibrium is the situation where each player is playing their best response given that another player also play their best response. In other words, Nash equilibrium is when each player chooses a strategy that yield the player the highest pay-off, given that the strategy chosen by the other player.

Review Question 2 First of all, Prisoner's Dilemma is a game situation in which there is conflict between the collective interest of all the players and self interest of individual players where as its Nash equilibrium is not collectively optimal. As it is one-shot game mostly and it has only 1 Nash equilibrium that is not yield the best solution to players because of each player's concern for their self interest more and there is no cooperation, so this makes what Prisoner's Dilemma special. In this chapter, there is not only Prisoner's Dilemma game, as there are some game that yields more than 1 Nash equilibrium or doesn't have any Nash equilibrium and some can cooperate as well.

Review Question 3 Dominant strategy is better than any other strategy that a player might choose, no matter what strategy the other player choose. But the

Dominated strategy is the strategy that the player has at least one strategy that gives higher pay off, no matter what the other choose. So the reason that a player in a game would be unlikely to choose a dominated strategy is because of dominated strategy does not yield the highest pay off to a player, no matter what the other player choose and also the dominant strategy would already be the Nash equilibrium's strategy if a player has.

		Kirin			
Asahi		¥630	¥660	¥690	¥720
Asahi	¥630	189, 180	184, 178	185, 175	186, 173
	¥660	178, 184	183, 183	192, 182	194, 180
	¥690	175, 185	182, 192	191, 191	198, 190
	¥720	173, 186	180, 194	190, 198	196, 196

a) Asahi and Kirin don't have dominant strategy.

b) Asahi's dominated strategy is ¥720.
Kirin's dominated strategy is ¥720.

c) Asahi and Kirin both have another dominated strategy which is ¥690.

d.) Having eliminated dominated strategies, Asahi and Kirin now have dominant strategy which is 7630 for both.

e.) The Nash equilibrium of this game is when Asahi charges 7630 and Kirin charges 7630 as well.

14.15)

	Columbia Pictures		
	Beta (π_c)	VHS ($1-\pi_c$)	
Sony.	Beta (π_s)	20, 10	0, 0
	VHS ($1-\pi_s$)	0, 0	10, 20

Expected value of Columbia Pictures choosing Beta: $E_C[\text{Beta}] = (10)(\pi_s) + (0)(1-\pi_s) = 10\pi_s$

Expected value of Columbia Pictures choosing VHS: $E_C[\text{VHS}] = 0(\pi_s) + 20(1-\pi_s) = 20 - 20\pi_s$

Expected value of Sony choosing Beta: $E_S[\text{Beta}] = 20(\pi_c) + 0(1-\pi_c) = 20\pi_c$

Expected value of Sony choosing VHS: $E_S[\text{VHS}] = 0(\pi_c) + 10(1-\pi_c) = 10 - 10\pi_c$

Sony will choose Beta when $E_S[\text{Beta}] > E_S[\text{VHS}]$

$$20\pi_c > 10 - 10\pi_c$$

$$30\pi_c > 10$$

$$\pi_c > \frac{1}{3}$$

So, Sony will choose VHS when $\pi_c < \frac{1}{3}$ and there will be indifferent between Beta and VHS when $\pi_c = \frac{1}{3}$

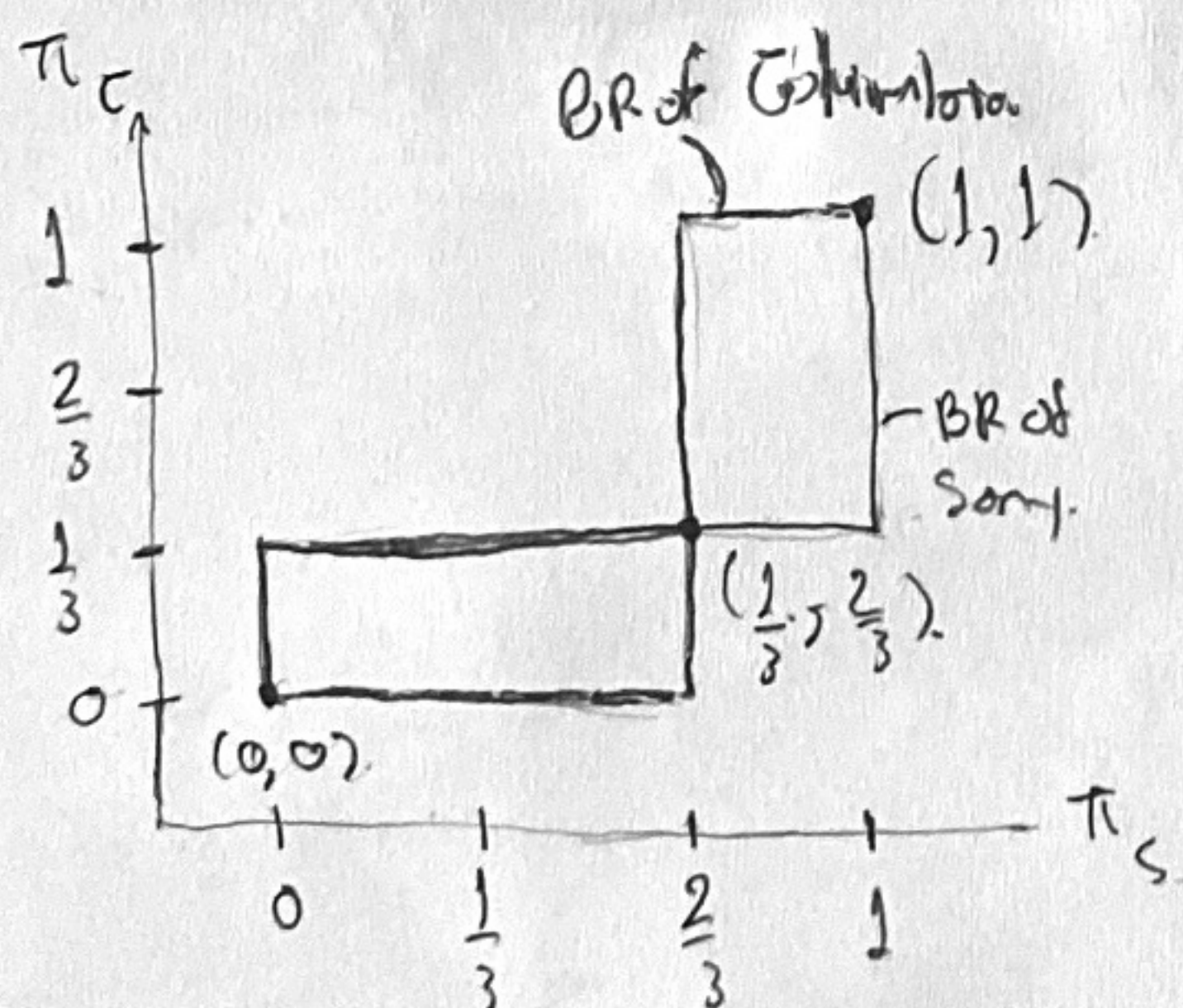
Columbia will choose Beta when $E_C[\text{Beta}] > E_C[\text{VHS}]$

$$10\pi_s > 20 - 20\pi_s$$

$$30\pi_s > 20$$

$$\pi_s > \frac{2}{3}$$

So, Columbia will choose VHS when $\pi_s < \frac{2}{3}$ and there will be indifferent between Beta and VHS when $\pi_s = \frac{2}{3}$



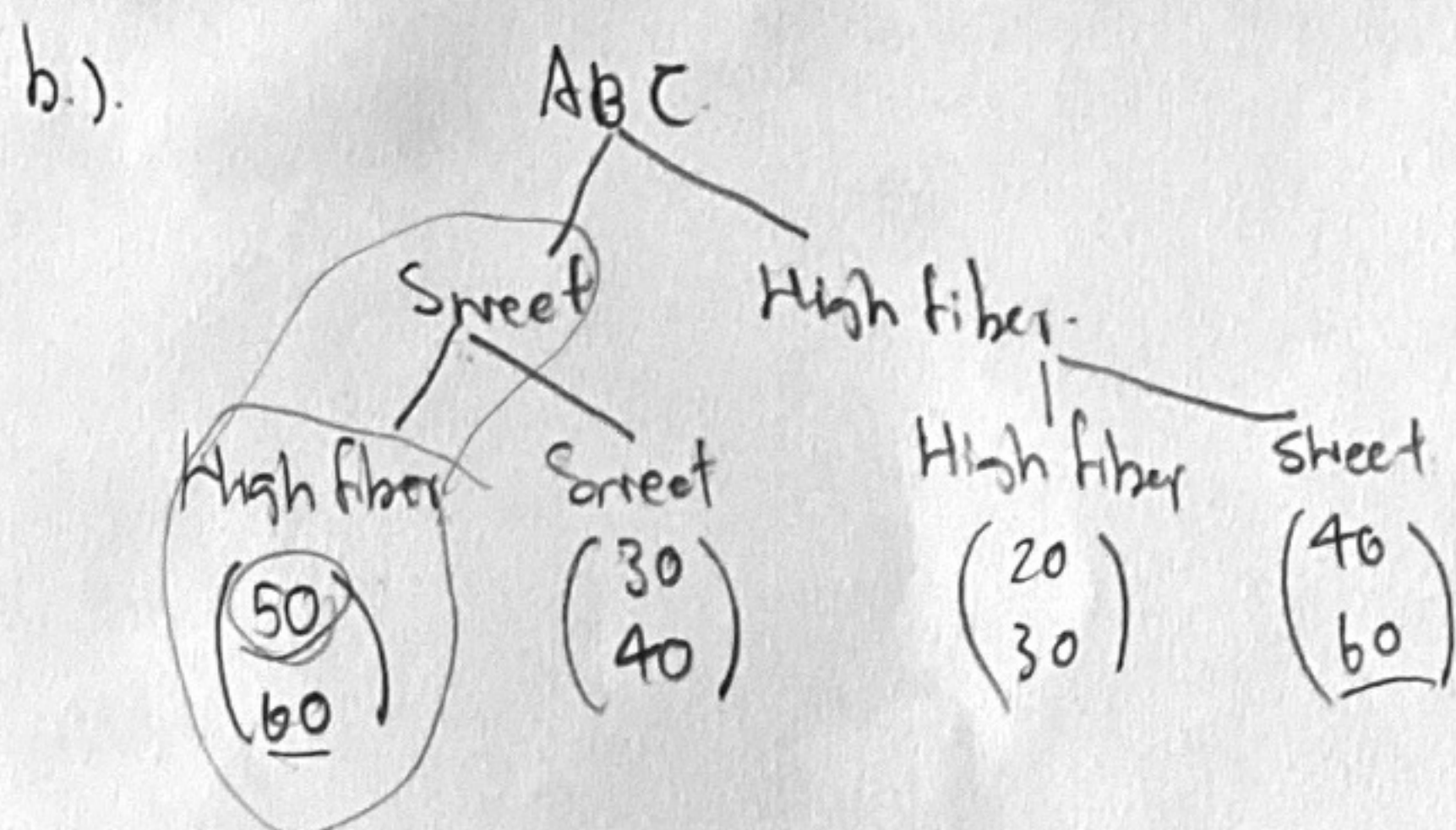
$\therefore$ There are 3 mixed strategy Nash equilibrium in this game which are $(\pi_c, \pi_s) = (0, 0), (\frac{1}{3}, \frac{2}{3}), (1, 1)$.

14.23)		High Fiber	Sweet
ABC	Sweet.	50,60	30,40
	High Fiber.	20,30	40,60

a.) There is no unique Nash equilibrium as there are 2 Nash equilibrium where

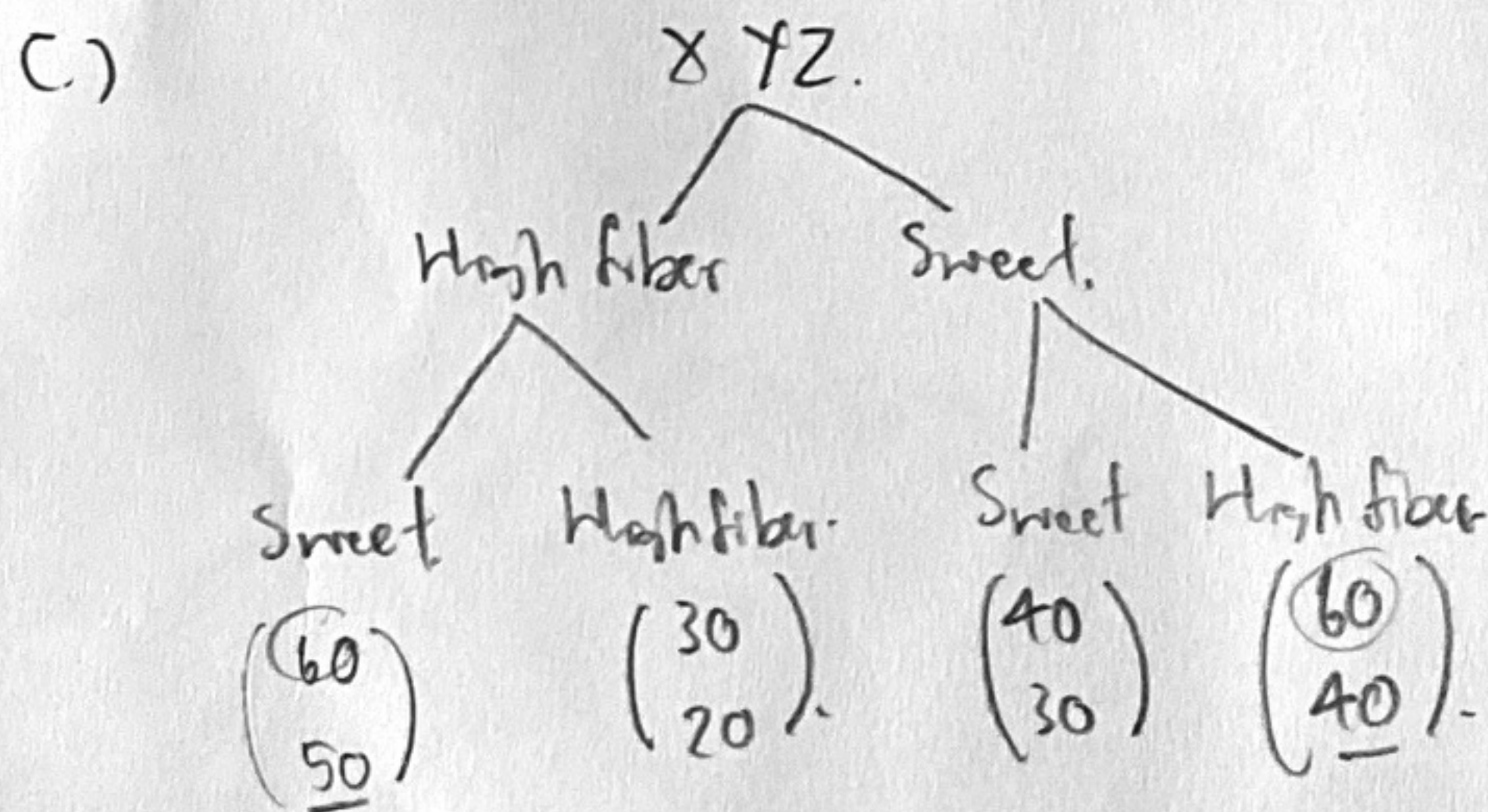
ABC is sweet, XYZ is high fiber and ABC is high fiber and XYZ is sweet.

This is because they do not want to do the same thing as if one of them choose high fiber, the other will choose sweet instead.



ABC would have a first-mover advantage, as simultaneous move has 2 Nash equilibrium which might make ABC end up with either 50 million pesos or 40 million pesos.

But this advantage will make ABC gain 50 million Pesos profit.



XYZ would not have a first-mover advantages since the 2 Nash equilibrium in simultaneous move yields XYZ 60 million pesos profit. And under Sequential-move, XYZ also get 60 million Pesos profit as well.

Therefore, being the first mover for XYZ doesn't make any advantage to itself.