EE311 EX.7

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Review Question 1: What is a Nash equilibrium? Why would strategies that do not constitute a Nash equilibrium be an unlikely outcome of a game?

Ans: *Nash Equilibrium is situation that each player plays best response given whatever strategy other players are playing. Since, under perfect information format, the Nash Equilibrium is situation where all players achieve best response for self-interest given the strategy chosen by others, the strategies that do not constitute a Nash equilibrium simply lead to non-best response for each player which won't be the choice chosen in the situation that other better responses yielding Nash Equilibrium is available. Also, it is self-enforcing mechanism as each player maximizing their self-interest will expect others to choose Nash Equilibrium as well leading to all players play strategy under Nash equilibrium.*

Review Question 2: What is special about the prisoners' dilemma game? Is every game presented in this chapter a prisoners' dilemma?

Ans: *Prisoners' dilemma game is situation where there exists conflict between collective interest and self-interest of individuals in a way that pursuit of self-interest leads to actions deteriorating collective interest of them. Most of the games presented in this chapter is* prisoners' dilemma.

Review Question 3: What is the difference between a dominant strategy and a dominated strategy? Why would a player in a game be unlikely to choose a dominated strategy?

Ans: *Dominant Strategy is a strategy that is better than any other a player might choose, no matter what strategy the other player follows, while Dominated Strategy is strategy such that the player has another strategy that gives a higher payoff no matter what the other player does. Players in rational frame will maximize their pay-off, and the very concept of dominated strategy is that there is a better choice than itself, so players simply choose any strategy that is not dominated one.*

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14.6)

Asahi \ Kirin	¥630	¥660	¥690	¥720
¥630	180, 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 has ¥720 as dominated strategy to ¥690
Kirin has ¥720 as dominated strategy to ¥690 y
c) Asahi and Kirin then have ¥690 as dominated strategy to ¥660
d) Asahi and Kirin findly have ¥660 as dominated strategy to ¥630
e) Hence, it is left with Nash Equilibrium (180,180); both company charge ¥630.

14.15) b.)

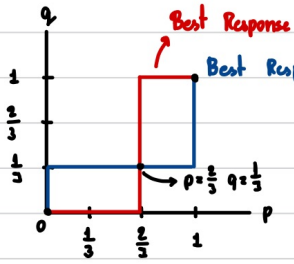
Sony \ Columbia Pictures	Beta (q)	VHS (1-q)
Beta (p)	20, 10	0, 0
VHS (1-p)	0, 0	10, 20

p is prob. that Sony choose Beta, q is prob. that Columbia choose Beta

$E_s[\text{Beta}] = 20q$
$E_s[\text{VHS}] = 10(1-q) = 10-10q$
$E_c[\text{Beta}] = 10p$ $E_c[\text{VHS}] = 20-20p$

∴ Sony play Beta if $E_s[\text{Beta}] > E_s[\text{VHS}]$
$(p=1)$ $20q > 10-10q$
$q > \frac{1}{3}$
Sony play VHS if $E_s[\text{Beta}] < E_s[\text{VHS}]$
$(p=0)$ $q < \frac{1}{3}$
Sony is indifferent b/w Beta & VHS if $E_s[\text{Beta}] = E_s[\text{VHS}]$
$(p \in (0,1))$ $q = \frac{1}{3}$

∴ Columbia play Beta if $E_c[\text{Beta}] > E_c[\text{VHS}]$
$(q=1)$ $10p > 20-20p$
$p > \frac{2}{3}$
Columbia play VHS if $E_c[\text{Beta}] < E_c[\text{VHS}]$
$(q=0)$ $p < 2/3$
Columbia is indifferent b/w choices if $E_c[\text{Beta}] = E_c[\text{VHS}]$
$q \in (0,1)$ $p = \frac{2}{3}$



∴ There is Mixed Strategy Nash Equilibrium
at p : Sony probility of choosing Beta = $\frac{2}{3}$ and
q : Columbia probility of choosing Beta = $\frac{1}{3}$
,and Pure Strategy Nash Equilibriums when
1. Both Sony and Columbia choose Beta or
2. Both Sony and Columbia choose VHS.

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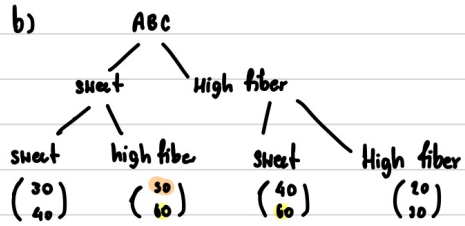
14.23)

ABC \ XYZ	High Fiber	Sweet
Sweet	50, 60	30, 40
High Fiber	20, 30	40, 60

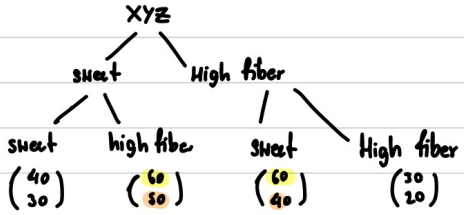
a) Simultaneously moving, both firm won't have unique Nash equilibrium, as when ABC choose sweet, XYZ will choose High fiber as best response, and when ABC choose High fiber, XYZ will choose Sweet as best response, where ABC will have the same best response given XYZ choice.

b)



ABC has first-mover advantage as it get the higher pay off from possible Nash equilibriums by
ABC first choose Sweet, then XYZ choose High fiber

c)



XYZ has no first mover advantage as the pay-off is the same for all possible Nash equilibriums; hence, sequential move eventually yield the same pay-off as simultaneous move.