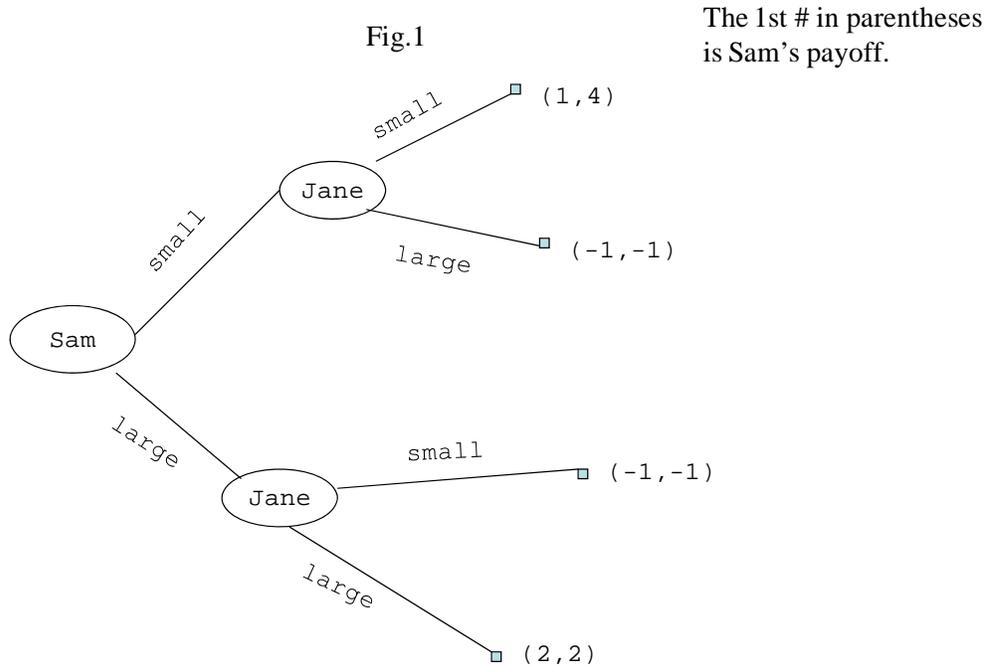


## PROBLEM SET FOUR--ECON 3010

1. In Table 1, is there a DS  $\underline{e}$  in the game? If not, are there any Nash  $\underline{e}$ ? If there are more than one Nash  $\underline{e}$ , how can the game have a solution?
2. In Table 2, is there a DS  $\underline{e}$ ?
3. Find the sub-game perfect Nash equilibrium in Figure 1. What happens if Jane announces she will always choose *small*?
4. Why do firms form a cartel? What are the problems a cartel has?

Table 1		<u>Betty</u>	
		Left	Right
<u>Abe</u>	Top	6, 3	3, 2
	Bottom	4, 7	5, 8

Table 2		<u>Zeke</u>	
		Deny	Confess
<u>Babe</u>	Deny	-1,-1	-10, 0
	Confess	0,-10	-8,-8



## Answers

1. No DS for either player. 2 Nash  $\underline{e}$ : {top, left} & {bottom, right}. Abe prefers {top, left} & Betty prefers {bottom, right}, so she tries to commit to right, & he tries to commit to top. If one succeeds, that tells us which Nash  $\underline{e}$  we will see.
2. Both have DS: confess, so DS  $\underline{e}$  is {confess, confess}.
3. {large, large} is SGP Nash  $\underline{e}$ . If Jane announces a strategy of always going small, & he believes this, the Nash  $\underline{e}$  is {small, small}. However, he should not believe this unless a) she has committed to small; or b) this is part of a repeated game, so it pays her to develop a reputation for going small.
4. Competitive firms will tend to earn zero profit in the long run. If all of the N firms in a market collude & agree on output quotas, these firms act like a monopolist: versus competition,  $Q \downarrow P \uparrow$ , &  $\pi \uparrow$ , so  $\pi > 0$ .  
However, an individual firm that cheats on the agreement has a demand that is more elastic than the demand it has a non-cheating cartel member, the latter being essentially  $\frac{1}{N}$  of the market demand. Since  $MR = P(1 + \frac{1}{E_p^D})$ , if  $|E_p^D| \uparrow$ ,  $MR \uparrow$  given P. If  $E_p^D = -2$ ,  $MR = .5P$ . If  $E_p^D = -4$ ,  $MR = .75P$ . Thus, firms collude to make  $\pi \uparrow$ , but the same incentive for  $\pi \uparrow$  induces cheating.  
If firms differ in MC, internal cartel politics may dictate output quotas that are not consistent with each firm producing where MC is the same, which implies  $\pi$  is lower, & there is less to gain from not-cheating.  
Cheating is harder & the cartel is easier to maintain the fewer firms there are, & the more each knows about the others.