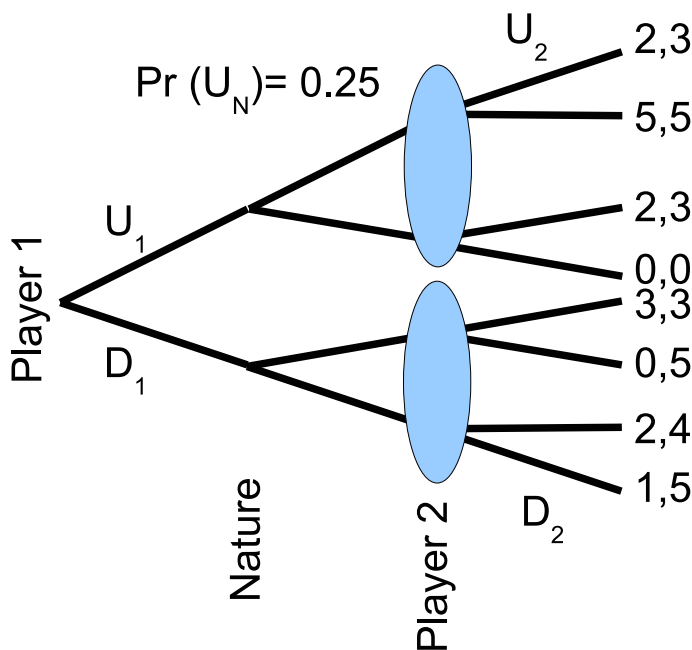


EEP 100 — Problem Set 3 (Due Nov 24, 2009)

- (1) (1 pt) Find the mixed-strategy equilibrium (percent of the time for each move) for Player 1 and Player 2 in this simultaneous move, one-shot game. (Hint: Think reaction functions).

		Player 2	
		Left	Right
Player 1	Up	5,2	1,4
	Down	2,5	3,2

- (2) (1 pt) Find the strategy for Player 1 and Player 2 (what moves to make) in this sequential move, one-shot game. Note that Nature moves after Player 1, going UP with a probability of 0.25 and DOWN with a probability of 0.75. Neither player knows Nature's move. Thus, Player 2 observes Player 1's move but does not know if Nature goes up or down.



[NOTE: I did not label all branches with moves because there was no space, but your answer should be in the form of “Player 1 moves  $x$ ; and Player 2 moves  $y$ ” where  $x$  and  $y$  mean up or down.]

- (3) (1.5 pts) Suppose there are two firms in an isolated market (no other entry) that produce identical beef. Firm 1's marginal cost is \$1 per lb of beef, and Firm 2's marginal cost is \$2 per lb; there are no fixed costs. Suppose that each firm chooses its own output simultaneously without knowing its rival's choice (therefore this is a Cournot model). Market demand is  $Q = 100 - 10P$ .
- (a) Find the reaction function for each firm, and draw them in a two-dimensional diagram with  $q_1$  on the horizontal axis and  $q_2$  on the vertical axis, where  $q_1$  is Firm 1's output and  $q_2$  is Firm 2's output.
  - (b) Find the equilibrium output for each firm using their reaction functions, and label equilibrium on your diagram from part (a).
  - (c) Find market price ( $P^*$ ) and quantity ( $Q^*$ ) in equilibrium.
  - (d) Compute each firm's equilibrium profit.
- (4) (1.5 pts) Consider a market of beef with the same setup as in the previous question *except* that Firm 1 is a Stackelberg leader that chooses its own output ( $q_1$ ) first. Firm 2 (the follower) observes this choice before choosing its output ( $q_2$ ).
- (a) Find Firm 1's optimal action and Firm 2's optimal response. Draw them in a two-dimensional diagram with  $q_1$  on the horizontal axis and  $q_2$  on the vertical axis.
  - (b) Find the equilibrium output for each firm, and label the equilibrium point in your diagram in part (a).
  - (c) Find market price ( $P^*$ ) and quantity ( $Q^*$ ) in equilibrium. Is the price higher or lower than in Question 3? What about total quantity?
  - (d) Compute the profit for each firm in equilibrium. Is Firm 1's profit higher or lower than Firm 1's profit in Question 3? What about Firm 2's profit?