Microeconomics, Review Notes
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Keywords: (midterm review), actions and strategies, payoff matrix, best response, Nash equilibrium, Cournot model, Stackelberg model

Concept check Q1. Player 1's action set is $A_1 = \{U, D\}$. Describe S_1, the set of his mixed strategies.

Concept check Q2. Consider the payoff matrix below.

Anne \Bob	Left	Right
Up	(2,3)	(1,4)
Middle	(1,4)	(3,3)
Down	(4,2)	(2,5)

(a) Is "Up" a strictly dominated strategy?

(b) Find the mixed strategy Nash equilibrium.

Concept check Q3. Two firms compete by simultaneously choosing quantity produced. The inverse demand function is given by $P(q_1, q_2) = 12 - q_1 - q_2$, where q_1 and q_2 are quantity produced by firm 1 and firm 2. The two firms have an identical cost function $C(q_i) = 4q_i$, $i = 1, 2$.

(a) Write down firm 1's profit function. Find the best response function of firm 1.

(b) Find a Nash equilibrium.

Concept check Q4. Consider a partnership between two players. The joint profit is $4e_1+4e_2+e_1e_2$, where e_i, $i = 1, 2$ is player i's effort. Each receives a half of the joint profit. The two players have an identical cost of effort $C(e_i) = e_i^2/2$.

(a) Write down player 1's profit function. Find the best response function of player 1.

(b) Find a Nash equilibrium.

Concept check Q5. Two firms each choose quantity with the market demand function $P = 12 - q_1 - q_2$. Firm 1 (the leader) first chooses q_1 and then firm 2, observing q_1, chooses q_2. Assume the cost of producing any quantity is zero.

(a) Examine $(q_1, q_2) = (4, 4)$ is a Nash equilibrium.

(b) Imagine Firm2 says, "Firm1, if you produce 4, I will produce 4. Otherwise, I will produce $q_2 = 12 - q_1$ so we both earn zero profits." Check if Firm2's message is a credible threat.

(c) Find the subgame perfect equilibrium.