Energy and Resource Economics (IKT3610)
Study questions - 03.01.2020
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1. ***Question:***

   Suppose that the fishing effort is denoted by h_i where i denotes the fisher i. All the rest of the fishers are denoted by $-i$. For simplicity, we assume that there are two fishers in total.

   a- The firm i's catch is given by $q_i = \theta h_i x$, where θ is a technology parameter and x is the fish stock? Interpret this equation for firm's catch (or harvest).

   b- The fish stock grows according to the logistic growth curve $g(x) = \gamma(1 - x/K)x$ where γ is a growth parameter and K is the carrying capacity. Interpret this logistic growth curve.

   c- We assume that the fishery operates in a steady-state equilibrium. What does this mean?

   d- If there was only one firm, the fishing effort h would be equal to

   $$h = \frac{\gamma(\theta KP - \omega)}{2\theta^2 KP}. \tag{1}$$

   If there were two firms, the best-response function of firm i would be

   $$h_i = \frac{\theta PK(\gamma - \theta h_{-i}) - \omega\gamma}{2\theta^2 PK}. \tag{2}$$

   Drive these results yourselves. Why are the two outcomes different? Explain.

   e- Suppose that $K = 100, \gamma = 4; \theta = 0.01; \omega = 40; P = 100$. Calculate h and h_i. Using these information at hand, calculating the cooperative and competitive effort levels and profits.

   f- Using these outcomes, and for $K = 100, \gamma = 4; \theta = 0.01; \omega = 40; P = 100$, construct the payoff matrix and find the Nash equilibrium and interpret the result. (Hint: Each fishermen has two strategies: cooperate OR play deviate. The harvest when a fisher deviates can be calculated from the best-response function)