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Time: 2:00

INDUSTRIAL ORGANIZATION
(B.S. in Economics and B.S. in Management)

Midterm exam

Answer each question on a separate sheet of paper. Good luck!

1. [15 minutes; 4 points] The following statement was recently made by a former student of this course:

> "If all firms in the competitive fringe use the same technology, their number does not affect the market equilibrium."

Comment in no more than ten lines (graphs, if any, excluded) while agreeing or disagreeing.

2. [15 minutes; 4 points] Jane Theory, the best student in her class, said:

> "In a duopoly with two firms competing *à la* Cournot, as one becomes much more efficient than the other we approach a monopoly result in which one of the firms captures the whole market while charging its own monopoly price."

Comment in no more than ten lines (graphs, if any, excluded) while agreeing or disagreeing.

3. [45 minutes; 6 points] One firm, denoted 1, supplies a medicine whose *lifetime* demand is equal to $q = 10 - p$, producing it at a constant marginal and average cost of 4.

(i) What is firm 1's output? What will its profit be? Quantify.

Another firm, denoted 2, comes up with another medicine that is a perfect substitute for the medicine produced by firm 1. Firm 2 also produces at a marginal and average cost of 4. Firms compete in quantities, which they set simultaneously and independently.

(ii) How much will each firm produce? At what price will it be sold? How much will each firm profit?

Suppose the government decides that the production of this medicine must be centralized in a *profit maximizing* upstream firm, denoted U. The upstream firm produces at a constant marginal and average cost of 4 and sells its output to firm 1 and firm 2 at a wholesale price c, which becomes the only cost incurred by firm 1 and firm 2.

(iii) What are now the best-reply functions of each firm? Quantify and explain.

(iv) How much will firms 1 and 2 produce? [Hint: express the output of firms 1 and 2 as a function of c.]

If you did not solve question (iv), assume that $q = q_1 + q_2 = \frac{20-2c}{3}$.

(v) What wholesale price c will the upstream firm set?

(vi) Evaluate whether this centralized production arrangement improves social welfare compared to the scenario described in (ii).

4. [45 minutes; 6 points] Two firms, A and B, serve a market for an homogeneous good whose *lifetime* demand is $q = 10 - p$. They both produce at a constant marginal and average cost of 2, and compete in prices, which they set simultaneously and independently.

(i) What price will each firm quote? What will their profits be? Quantify and explain intuitively.

Firm A has suffered an industrial accident, whose consequences are not known to firm B. Firm B believes that the industrial accident was either catastrophic, forcing firm A to leave the market, or marginal, in which case firm A's marginal cost was unaffected, thus remaining at 2. Firm B attaches an equal probability, $1/2$, to each of the two scenarios, an assessment that is common knowledge. Obviously, firm A knows for sure which of the two scenarios actually happened.

(ii) Which price should firm B choose? What is its expected profit? Quantify and explain intuitively.

(iii) Which price will firm A choose if the industrial accident was marginal? What is its profit in this scenario? Quantify and explain intuitively.

Consider the two scenarios when answering the following questions.

(iv) Are consumers hurt by the industrial accident? Quantify and explain.

(v) And each of the firms? Quantify and explain. [Note: do not take into account the damages caused by the industrial accident.]

(vi) And society as a whole? Quantify and explain. [Note: do not take into account the damages caused by the industrial accident.]

(vii) Should firm A publicize whether the industrial accident was catastrophic or marginal? Explain intuitively.