

Department of Economics
The Ohio State University
Midterm Exam–Econ 805

Prof. Peck
February 10, 2004

Directions: *Answer all questions, carefully label all diagrams, and show all work.*

1. (30 points)

Consider the following “quality disclosure” game, in which a seller owns an object that has no value to her, but is valuable to a potential buyer. The value to the buyer is either \$10, \$20, or \$30, each with probability one third. The seller observes the quality of the good (i.e., the value to the buyer), but the buyer does not observe the quality.

The game starts with nature informing the seller about the quality of the good. Next, the seller decides whether or not to disclose the true quality to the buyer. That is, the buyer either observes the disclosed quality (which is known to be the truth), or else observes that quality was not disclosed. Finally, the buyer decides whether or not to buy the good at a price of \$15. If the buyer does not buy, both players receive a payoff of zero. If the buyer buys, the seller receives a payoff of \$15 and the buyer receives a payoff equal to $q - 15$, where q denotes the quality of the good.

(a) *Draw and label the game tree. Be neat!*

(b) *This game has several weak perfect Bayesian equilibria. Construct a WPBE in which the seller **always** discloses its quality. (Remember to specify beliefs as well as strategies.)*

(c) *Construct a WPBE in which the seller **never** discloses its quality. (Remember to specify beliefs as well as strategies.)*

2. (30 points)

Two firms are engaging in Cournot (quantity) competition. The market demand curve is given by

$$D(p) = 2300 - 10p,$$

where p denotes the market price and $D(p)$ denotes the total quantity demanded at that price. Letting y_i denote the output quantity of firm i (for $i = 1, 2$), the firms have the cost functions

$$\begin{aligned} c_1(y_1) &= \frac{(y_1)^2}{5} \quad \text{and} \\ c_2(y_2) &= \frac{(y_2)^2}{10}. \end{aligned}$$

Find the Cournot-Nash equilibrium strategies, and find the equilibrium price.

3. (40 points)

Consider a market that is initially served by a single, monopolistic firm with constant average and marginal costs equal to c . There is one consumer, with a utility function over consumption of the produced good, x , and consumption of the numeraire good, M , given by

$$u(x, M) = 2\sqrt{x} + M.$$

Also, assume that the consumer has a zero endowment of good x , and a large enough endowment of the numeraire good so that we do not have to worry about nonnegativity constraints on numeraire consumption. For the questions below, your answer will depend on the parameter, c .

(a) *Assuming that the monopolist sets a price (of good x in terms of the numeraire) denoted by p , and allows the consumer to purchase as much as he/she wants to purchase at that price, what will be the profit maximizing monopoly price and what will be the monopoly profit?*

(b) *Suppose that the monopolist can choose the number of units of output, x , in its “package,” and can choose a price for its package, P . The consumer decides whether to purchase the package or to purchase nothing. What values of (x, P) will maximize the monopolist’s profits, and what will be the profit level?*

(c) *Now suppose that this industry is characterized by long run perfect competition, with free entry of firms who have constant average and marginal cost equal to c . What would be the equilibrium price and quantity demanded?*