Background Quiz

September 8, 2006

Each question is worth 5 points. Since it's the first test, I'll also give you 5 bonus points, making the test out of 50.

Monopoly Pricing

1. Suppose a monopolist faces demand curve $p = 1 - q$ and has marginal cost $c = 1/2$.
(a) What is the monopoly price and quantity?
(b) Suppose the firm has a fixed cost $K = 1/8$. What quantity should they produce?

2. A monopolist makes red and blue bikes. In order to make any bikes, the firm must pay fixed cost 100. The demand for blue bikes is $p = 20 - q$, while the demand for red bikes is $p = 10 - q$. The marginal cost for both bikes is zero.
(a) If you produce both types of bikes, how many should you produce of each?
(b) Your accountant states that the shared overhead that should be attributed to the red bike production line is \$50. He then points out that the red bike production line is losing money and should thus be closed down. Is he correct?

Oligopolistic Competition

3. Two firms compete via Bertrand competition (i.e. they name prices simultaneously). Suppose their marginal costs are $c_1 = 1/4$ and $c_2 = 1/2$, and face demand $p = 1 - q$. What are the equilibrium prices, quantities and profits?

4. Two firms compete via Cournot competition (i.e. they name quantities simultaneously). Suppose they have identical marginal cost $c \in [0, 1]$ and face demand $p = 1 - q$. What are the equilibrium prices, quantities and profits?

5. Two firms compete via Stackelberg competition. In period 1, firm 1 names quantity q_1. In period 2, firm 2 sees q_1 and subsequently chooses quantity q_2. Suppose the firms both have identical marginal cost $c \in [0, 1]$ and face demand $p = 1 - q$. What are the equilibrium prices, quantities and profits?

Game Theory

6. Consider the following 2×2 pricing game, where firms choose whether to price High or Low simultaneously. Is there an equilibrium in dominant strategies?

		Firm 2: High	Firm 2: Low
Firm 1	High	$4, 4$	$1, 5$
	Low	$5, 1$	$2, 2$

7. Consider the following 2×2 product location game, where two shops consider setting up in either the City or the Suburb. Both firms would like to locate in the City but, if the other also locates in the City, then a price war ensues and the firms make no profit. What are the (pure strategy) Nash equilibria of this game?

		Firm 2: City	Firm 2: Suburb
Firm 1	City	$0, 0$	$2, 1$
	Suburb	$1, 2$	$0, 0$

8. Suppose the firms play the City–Suburb game sequentially. Firm 1 first chooses City or Suburb. Firm 2 sees this choice, and subsequently chooses City or Suburb. Draw the extensive form of this game. Using backwards induction, what is the (subgame perfect) equilibrium?

Optimisation

9. A firm chooses to invest in two production lines. Denote the investment in line $i \in \{1, 2\}$ by x_i. The firm has profit $\pi = x_1^\alpha x_2^\beta$ and has a budget constraint $x_1 + x_2 \leq 1$. Set up the firm's Lagrangian and solve the optimisation problem.