

# Intermediate Micro In-Class Problems

## Oligopoly & Game Theory

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### Triopoly & Firm Agglomeration

There are three firms producing Valyrian steel swords. Each firm has constant marginal costs of production of  $c$ . Each firm  $i$  simultaneously chooses a quantity  $q_i$ . The market price,  $p$  per sword is determined by  $q_1, q_2, q_3$  using the following inverse demand curve:

$$p = \text{Max}\{1 - q_1 - q_2 - q_3, 0\}$$

1. Fix the quantities chosen by firms 2 and 3 at  $q_2$  and  $q_3$  respectively. Compute firm 1's profit maximizing quantity choice as a function of  $q_2$  and  $q_3$ . This is firm 1's reaction function.
2. What are the equilibrium quantities chosen by each of the firms?
3. Firms sometimes merge for efficiency reasons. Suppose Firms 1 and 2 were to merge into a single firm. The marginal costs of production of this merged firm will be a constant  $0.9c$  per unit. What are the equilibrium quantity choices of both the merged firm and firm 3?
4. Is firm 3 made worse off by the merger of firm 1 and 2?
5. Are consumers made worse off by the merger of firms 1 and 2?

### Price Discrimination

Devlin-McGregor is the monopoly seller of Provasic to a market of 100 buyers. Buyers are of two types, heavy and light, and there are an equal number of each type. The inverse demand curves are  $p_H(q) = 8 - 2q$  for heavy users and  $p_L(q) = 2 - q$  for light users. Devlin-McGregor produces Provasic at a constant marginal cost of ¥1 per unit.

1. If Devlin-McGregor could perfectly discriminate between the two types of buyers and they were restricted to setting a per-unit price, what prices should they charge each type to maximize profit?

2. Suppose the Government were to ban such price discrimination and require Devlin-McGregor to charge all customers the same per-unit price. What price should the firm set to maximize its profit?
3. Does consumer surplus go up or down after the ban?
4. Suppose the Government allowed Devlin-McGregor to set a single two-part tariff. What would the profit-maximizing two-part tariff be?
5. Suppose the two-part tariff identified in part (4) is in place. The Government is contemplating subsidizing buyers to the tune of ¥2 per unit of Provasic purchased. Should Devlin-McGregor adjust its two part tariff to account for this and if so, how?