Part I: Multiple-choice questions. Select exactly one alternative for each question. Each correct answer gives 5 points and each incorrect answer -1 point.

1. Two identical firms are competing à la Cournot in a market. In equilibrium, the *Lerner Index* for each firm is given by $1/6$. What is the absolute value of the price elasticity of industry demand?

   (a) 1.
   (b) 2.
   (c) 3.
   (d) 4.
   (e) None of the above.

2. What is a SSNIP (Small but Significant Non-transitory Increase in Price) test?

   (a) A way to determine the relevant market.
   (b) A way to test if an equilibrium in a market with network externalities is stable.
   (c) A way to test if an innovation is drastic.
   (d) A way to test if firms are colluding.
   (e) None of the above.

3. A market has 5 firms. One of them has a market share of 40%, a second 30%, and the other three 10% each. Which of the following statements is *false*?

   (a) The 3-firm concentration ratio is 80%
   (b) The 4-firm concentration ration is 90%
   (c) The market has a *HHI* equal to 2,600
   (d) A merger between the two biggest firms increases *HHI* by 2400.
   (e) A merger between the two of the smallest firms increases *HHI* by 200.

4. Three firms compete in prices with homogeneous products. If they collude they share the monopoly profit 15 equally, otherwise they earn 0. Suppose the firms play a grim trigger strategy (start to collude but switch irreversibly to competition if there is a deviation). What is the minimum discount factor necessary to support collusion?

   (a) 2/15.
   (b) 4/15.
   (c) 1/3.
   (d) 2/3.
   (e) 3/5.

5. Which of the following alternatives is false?

   (a) Under Cournot competition, a firm has no incentive to license a drastic innovation to a competitor.

   (b) Under Cournot competition, a firm has no incentive to license a non-drastic innovation to a competitor.

   (c) Under Bertrand competition, a firm has no incentive to license a drastic innovation to a competitor.

   (d) Under Bertrand competition, a firm has no incentive to license a non-drastic innovation to a competitor.

   (e) None of the above.

6. Firms, 1 and 2, can produce two incompatible versions of a network good, A and B. The matrix below illustrates the firms' payoffs depending if they choose to standardize or not.

Firm 2

Firm 1	A	B
A	π_1^{AA}, π_2^{AA}	π_1^{AB}, π_2^{AB}
B	π_1^{BA}, π_2^{BA}	π_1^{BB}, π_2^{BB}

Suppose, $\pi_1^{AA} > \pi_1^{BA}, \pi_2^{AA} > \pi_2^{AB}$ and either $\pi_1^{AB} > \pi_1^{BB}$ or $\pi_2^{BA} > \pi_2^{BB}$. Which of the following situation does this represent?

   (a) "Straightforward standardization".

   (b) "Battle of the sexes".

   (c) "Standards war".

   (d) "Pesky little brother".

   (e) None of the above.

Part II: Questions that require answers with calculations/motivation

7. A monopoly with zero marginal cost is selling a good to two types of customers in equal shares: high income (H) and low income (L). The demand functions for each type of customer are given by $Q_H(p) = 12 - p$ and $Q_L(p) = 10 - p$.

   (a) (10 points) Suppose the firm practices *group pricing*. What are the profit-maximizing prices, p_H and p_L, for the two types of customers?

   (b) (10 points) Suppose the firm practices *menu pricing* using a two-part tariff, (A, p). What is the profit-maximizing two-part tariff?

8. Consider a monopoly firm producing two goods, A and B, at zero cost. A unit mass of consumers have preferences over the two goods. A consumer is identified by the couple (θ_A, θ_B), where θ_A and θ_B are the valuations over the goods. Assume (θ_A, θ_B) is distributed uniformly over the unit square (i.e. the valuations for A and B are independent and uniform over $[0, 1]$).

   (a) (10 points) Illustrate using a diagram which consumers buy the goods if the goods are sold separately at the prices p_A and p_B, both between zero and one. Then, calculate the profit-maximizing prices p_A and p_B.

   (b) (10 points) llustrate using a diagram which consumers buy the goods if the goods are sold using *pure bundling* (with one unit of each good) at a price p, between zero and one. Then, calculate the profit-maximizing price p.

9. Consider an (irreversible) investment decision of an incumbent facing potential entry. The incumbent may either invest to deter entry or to accommodate entry.

   (a) (5 points) Explain what the direct effect and the strategic effect of the investment is.

   (b) (10 points) Explain whether the incumbent should "overinvest" or "underivest" to deter (D) entry and to accommodate (A) entry in the four scenarios given in the matrix below.

Investment makes the incumbent

		Tough	Soft
Mode of competition	Strategic substitutes	D: .... A:	D: .... A: ....
	Strategic complements	D: .... A:	D: .... A: ....

10. The book presents model of network externalities with linear network effects. Consumer heterogeneity is represented by a uniformly distributed taste parameter $\theta \in [0, 1]$. Two scenarios are considered: Heterogeneous network effects and heterogeneous stand-alone benefits.

    (a) (10 points) Heterogeneous network effects: The utility of a consumer with taste θ is $U(\theta) = a + \theta v n^e$, where a and v measure the strength of the stand-alone benefits and the network effects respectively, and n^e is the expected network size. A consumer buys the good if the expected utility exceeds the price, p. (i) What is the inverse demand for the good when expectations are fulfilled? Illustrate this in a graph. (ii) Point out different possible equilibria, for a given p, in the graph and discuss stability and efficiency.

    (b) (5 points) Heterogeneous stand-alone benefits: The utility of a consumer with taste θ is $U(\theta) = \theta a + v n^e$. Illustrate the possible equilibria when stand-alone benefits are strong relative to the network effects, and vice-versa, in two graphs.