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. Suppose a profit maximizing monopolist has a constant marginal cost equal to 2 and faces the following inverse demand: P = 10 - Q. What is the Lerner index at the profit maximizing price?

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

2. Which of the following statements is *not true* about the oligopoly model of price competition with differentiated products we have examined in the course (where firms have linear demand of the type $Q_i = a - p_i + bp_j$).

   (a) Firms set prices so that MR = MC.
   (b) There is a 2nd mover advantage if the game is sequential and the first firm can commit to its price.
   (c) The equilibrium price increases with the degree of product differentiation.
   (d) The equilibrium price increases in market concentration.
   (e) Prices are strategic substitutes.

3. Consider a competitive market where demand is given by Q = 50 - P, and the marginal cost for all firms is 30. Suppose one firm patents an innovation lowering its marginal cost. How low must the new marginal cost be to make the innovation drastic? It must be just below

   (a) 20
   (b) 17.5
   (c) 15
   (d) 10
   (e) 5

4. Consider two firms that first invest in cost reducing R&D and then compete in the product market. Some of the R&D investments spill over to the competitor. Which of the following alternative is *false*.

   (a) The strategic effect of increased R&D on a firm's own profit is negative for small spillovers and positive for large spillovers under quantity competition.
   (b) The strategic effect of increased R&D on a firm's own profit is always negative for price competition.
   (c) R&D cooperation leads to more R&D (than non-cooperative R&D investments) when spillovers are large.
   (d) Full information sharing in a R&D joint venture makes cooperation in the investment phase more attractive from a welfare perspective.
   (e) The negative free-riding effect of spillovers is mitigated if R&D provides an "absorptive capacity".

5. Gela2 sells ice cream and coffee at a unit cost of 1 each. There are three types of clients, A, B, and C, and their reserve prices for one unit of the two goods are as indicated below (their reserve price is zero for additional units). The firm cannot observe the type of the client, but knows thT 50% of clients are of type A, 30% of type B, and 20% of type C. What is the profit-maximizing price, p, of a bundle of an ice-cream and a cup of coffee if the firm practices *pure bundling*?

	Ice cream	Cup of Coffee
A	6	2
B	10	6
C	14	8

(a) $p = 22$.

(b) $p = 16$.

(c) $p = 14$.

(d) $p = 10$.

(e) $p = 8$.

6. Which of the following alternatives is *false*?

(a) Under Bertrand competition, a firm wishing to deter entry adopts a top dog strategy if the investment makes it though.

(b) Under Bertrand competition, a firm wishing to accommodate entry adopts a fat cat strategy if the investment makes it soft.

(c) Under Cournot competition, a firm wishing to accommodate entry adopts a puppy dog strategy if the investment makes it though.

(d) Under Cournot competition, a firm wishing to deter entry adopts a lean and hungry look strategy if the investment makes it soft.

(e) None of the above.

Part II: Questions that require answers with calculations/motivation

7. (15 points) A monopolist with zero marginal cost faces two types of consumers, the affluent (A) and the bohemians (B). The groups are of equal size and the inverse demand for the groups are given by $P_A(q) = 10 - q$ and $P_B(q) = 8 - q$ respectively. What is the optimal two-part tariff (fixed fee and price per unit) assuming the firm cannot observe the type of the consumers, but can practice second-degree price discrimination? Should the monopolist sell only to the A group or to both groups?

8. Three firms compete in prices with homogeneous products. Perfect competition results in zero profits, but firms collude they share the monopoly profit, 15, equally.

   (a) (5 points) Suppose the firms play a trigger strategy where they collude as long as the other firms cooperate but revert to perfect competition for ever following a deviation. Calculate the minimum discount factor δ necessary to support collusion.

   (b) (15 points) Suppose demand fluctuates and that the monopoly profit with high demand is 21, and that it is 15, as before, if demand is low. (i) Calculate the present value of collusion for a firm, assuming that collusion can be sustained. (ii) Calculate the minimum discount factor δ necessary to support collusion in this case. (Hint: The temptation to deviate is highest when demand is high).

9. Consider a Hotelling model where two firms, 1 and 2, are located at the endpoints of a unit interval and consumers are distributed uniformly over the interval. A consumer located at a distance x from firm 1 obtains a utility of $10 - 4x - p_1$ by purchasing one unit from firm 1 at the price p_1 and $7 - 4(1 - x) - p_2$ by purchasing one unit from firm 2 at the price p_2. All consumers have a reservation utility of zero and zero valuation of additional units. Both firms have a marginal cost of 1.

   (a) (10 points) Calculate the equilibrium prices in the model.

   (b) (10 points) Suppose we want to examine endogenous product differentiation in this type of model, i.e. introduce a stage where firms may choose their location. Explain what problems that can arise in a model with linear transportation cost. What is the equilibrium product differentiation in a model with quadratic transportation cost?

10. Consider a Cournot duopoly facing the inverse demand $P = 16 - Q$, where Q is aggregate quantity. Marginal cost is constant and equal for 1 for all firms.

   (a) (5 points) Calculate the equilibrium.

   (b) (10 points) Suppose, instead, that there is free entry into the market and that entry entails a sunk cost $e = 9$. All firms have the same marginal cost. What is the equilibrium number of firms in the market?