Problem 1 (60%)

Explain in your own words.

a) Explain the double marginalization problem and explain at least two possible ways vertically related monopolies can design their contracts in order to avoid this problem.
b) Explain why markets with incompatible network goods have a tendency to be dominated by a single good.
c) Explain the concept of two-sided markets and provide a theoretical argument for why social networks charge advertisers to place ads on their site, but let the users use their service for free.
d) In sealed-bid second-price auctions the optimal strategy is to bid your true valuation. Explain why this isn't the case in first-price auctions.
e) Does the optimal strategy in a first-price auction involve bidding closer to, or farther from, your true valuation as the number of competing bidders in the auction increases? Explain!
f) Consider a pair of competing firms where one firm has a high-quality product and the other has a low-quality product. Explain why it isn't always profitable for the low-quality producer to raise his quality, even if it didn't cost anything to do so.
g) Consider a game where two firms selling perfect substitutes compete in quantities with sequential moves. Explain why there is a first-mover advantage and why the advantage hinges on the first-mover's ability to commit to his action.
h) Consider again a game where two firms selling perfect substitutes, but now the firms compete in prices with sequential moves. Explain why there is now a second-mover advantage.
i) Explain why two firms who compete in quantities end up producing more, and earning lower profits, than a monopolist firm would.

Problem 2 (40%)

In this problem there are N firms. Each firm produces a quantity q_i of a homogeneous good, to a common marginal cost of zero. The inverse demand in the market is given by $p = 1 - Q$, where Q is total quantity supplied, $Q = \sum_i q_i$.

a) Let $\mathrm{Q}_{-\mathrm{i}}$ be the output of the other firms, from firm i's perspective: $\mathrm{Q}_{-\mathrm{i}} = \sum_{\mathrm{j}\neq\mathrm{i}} \mathrm{q}_{\mathrm{j}}$. Explain the problem that we assume each firm solves and derive the best response function for firm i.

b) Assume a symmetric Nash Equilibrium and show that the aggregate output will be given by

$$Q^{NE} = \frac{n}{(n+1)}$$

c) Derive the equilibrium price and the equilibrium per-firm profits.

d) Assume that there are three firms ($n = 3$), and that two of them merge so that only two firms are left. *As the model is formulated, would there be any synergies in such a merger?*
e) Explain what would happen to aggregate profits, the joint profits of the two merging firms and the consumer surplus following such a merger.
f) If the two remaining firms merge, so that only a single monopolist firm is left, will the two firms find such a merger profitable? Explain.
g) Assume now that there are some fixed costs of operating, such that per-firm profits are $\Pi(n) = pq_i - e$, and that $e = 1/20$. Assume that there is free entry. How many firms will find it profitable to enter in a free-entry equilibrium?
h) Assume that from the free-entry equilibrium, two of the firms consider merging, and that no further entry is possible after the merger. Would that merger be profitable? Explain!
i) If we instead assume that new firms are allowed to enter the market following the merger, under the same assumptions as in the free-entry equilibrium, would any potential entrant find such entry profitable? Explain why considering entry barriers is important when consider the competitive effects of the merger.