“Old style” question (LSE, Year 2 Microeconomic Principles I) – 50 marks

1. Define economies of scale. Under what conditions do firms have economies of scale? If a firm has a total cost function $c(q)=20+6q$ does it have economies of scale? (6 marks)
2. Is perfect competition possible if all firms in the industry have economies of scale? (12 marks)
3. What is a cartel? There are two firms in the industry. The inverse demand cure is given $by p=24-3Q$ where $Q$ is industry output. Firm 1 produces $q\_{1}$ with a total cost $c(q\_{1})=20+6q\_{1}$. Firm 2 produces $q\_{2}$ with a total cost $c(q\_{2})=20+6q\_{2}$. Can a two firm cartel operate profitably in the industry? (12 marks)
4. What is a Cournot-Nash equilibrium? Can the two firms operate profitably in the Cournot-Nash equilibrium? (12 marks)
5. How many firms will there be in the industry? (8 marks)

“New style” question 1 (LSE, Year 2 Microeconomic Principles I) – 50 marks

Andy is a student on a microeconomics course. His performance in the final exam depends on the number of days he revises. In particular, $s\left(q\right)=30+8q$, where $s$ denotes his percentage score in the exam and $q$ denotes the number of days spent revising$.$ Revising is hard work; $c\left(q\right)=q^{2}$ denotes the cost to Andy of revising for $q$ days. His payoff, $Π,$ is his exam score net of the cost of revising.

* 1. What are Andy’s exam mark and payoff if he does not revise at all? (3 marks)
	2. Write down an expression for $Π$ and find the number of days Andy will choose to revise, as well as his percentage score and payoff. (7 marks)
	3. Barry is also taking microeconomics. Andy proposes a plan for them to cheat in the final exam. They each score $s\left(q\_{1}, q\_{2}\right)=30+8\left(q\_{1}+q\_{2}\right)-6q\_{1}q\_{2}$ if they cheat, where $q\_{1}$ denotes the number of days Andy revises and $q\_{2}$ denotes the number of days Barry revises. Student $i$ has a cost of revising given by $c\left(q\_{i}\right)=q\_{i}^{2}$ and a payoff $Π\_{i}$, which is the student’s exam score net of their own revision cost, where $i=\left\{1,2\right\}$.
		1. Andy and Barry simultaneously choose $q\_{1}$ and $q\_{2}$, respectively. Find the students’ reaction functions. Are revision days strategic substitutes or strategic complements? (7 marks)
		2. Find the Cournot-Nash equilibrium in revision days. Should Andy and Barry pursue the plan? Explain why, or why not. (8 marks)
		3. Barry tells Andy he wants to see how much Andy has revised before choosing his own revision days. How much will the students revise if $q\_{1}$ and $q\_{2}$ are chosen sequentially? Briefly discuss the implications for Andy and Barry. What do you expect will happen? (10 marks)
	4. The University introduces a ‘leniency scheme’, whereby students who admit to cheating with other students and provide evidence of this receive no penalty whatsoever, provided they are the first to do so. The other cheating students get severe penalties (a zero mark or even expulsion). Briefly discuss the likely effects of this scheme. Would you find such a scheme desirable? (Draw on class reading in giving your answer). (15 marks)

“New style” question 2 (LSE, Year 2 Microeconomic Principles I) – 50 marks

Two price-setting firms facing marginal cost $c\_{1}=c\_{2}=c$ and no fixed costs produce identical face masks. They set their prices $p\_{1}$and $p\_{2}$ simultaneously. If they set the same price $p\_{1}=p\_{2}=p$, then they share the market equally and market demand for face masks is given by $Q=10-\frac{p}{10}$ in millions of units. If firms set different prices, then the firm that charges the lower price sells to the entire market

* 1. Find monopoly price as a function of $c$. (5 marks)
	2. Let $c=40.$ Describe the Bertrand Nash equilibrium of the duopolistic market (a diagram is not required). (5 marks)
	3. Now let $c\_{1}=40$ and $c\_{2}=80$. How does this affect the Bertrand Nash equilibrium? Explaining your reasoning. (10 marks)
	4. Again let $c=40$ and let $δ=\frac{6}{10} $denote the firms’ discount factor. Suppose firms interact indefinitely setting prices each period. If firms collude, then they aim to maximise industry profits, which they split evenly. If a firm cheats by undercutting price, then it reaps monopoly profit for that period. If a firm finds that its rival cheated in the previous period, then the collusive arrangement collapses and firms revert to the Bertrand Nash equilibrium forever. Analyse whether collusion is sustainable. Would your answer change if there were more firms, also with a marginal cost of 40? (15 marks)
	5. In recent weeks new firms have entered the face mask industry and are making profits from the sale of face masks. How can we explain this phenomenon if firms are price-setting? (5 marks)
	6. Is the growth in the available choice of face masks welfare improving? (Draw on class reading in giving your answer). (10 marks)

**Reflections on the new questions**

New question 1:

The reason why the new style question worked is that it relies on applying reasoning to a new setting, rather than following the steps of examples in the lecture/class. It doesn't include any definitions or parts that can be lifted from the lecture slides (unlike the old-style question for a closed-book timed exam). Computations make up around half the marks, with the rest of the marks awarded for discussing and explaining things and drawing from readings on the course, again applied to the specific context of the question.

There is also a computational trap in (c) (iii) that I don't talk about in the video. In the Stackelberg case, setting the FOC to 0 gives a minimum not a maximum. I've said a million times in lectures that they need to check the SOC. As expected, there were broadly three groups of answers. Those who didn't check the SOC and thus presented the payoff minimising choice as the correct answer, with minimal comment. Others did check the FOC but weren't sure what to do after figuring out it was a minimum. The stronger students realised there was a corner solution so examined the two corners and deduced the correct answer. The top candidates understood the 'leader' had an incentive to free-ride on the revision of the 'follower' and discussed that, commenting that while 0 revision by the leader and full revision by the follower is the SPE, it would not be 'likely to happen' in the real world.

New question 2:

This question was more recognisably close to the theory covered, but (c) lays a little trap in the monopoly price of the low cost firm is lower than the marginal cost of the high cost firm. So the correct answer is that the low-cost firm won't marginally undercut the high cost firm, but will jump down to its monopoly price. This is nuanced. Part (a) was supposed to give a hint in that direction.

It did work as expected. Quite a few students didn't spot the monopoly price issue.

Again, several subparts required explanation or discussion, or required students to apply ideas from readings to the particular context.