

(1) Put **your name**, your TA's name, and your section on the exam. (2) Answer only the number of problems specified in each section. You will not get extra credit for answering more questions. (3) Notice how many points each question is worth and allocate your time appropriately (DO NOT spend excessive time on the short-answer questions). (4) To get full credit on answers, you must be clear and rigorous: Define your variables, thoroughly label any graph, and interpret your graph or math in words. (5) You may keep this page.

A. 16-point problems (Answer only 3 of the following 4 questions)

A1. The government imposes a lump-sum tax on identical, competitive firms facing free entry and exit in the long run. Each firm's AC curve is "U-shaped." Use a two-panel graph (firm and market panels) to explain what happens to firm quantity (q), market quantity (Q), number of firms (n), price (p), and individual firm profit (π) in the short run.

A2. What are the welfare effects (consumer surplus, producer surplus, tax revenues, total welfare) of an ad valorem sales tax, α , assessed on a monopoly?

A3. Would a competitive firm ever operate in the downward sloping section of its average cost curve in the short run? (5 points) In the long run? (5 points) Would your answers change if the firm were a monopoly? (6 points)

A4. A local electric utility monopoly faces an inverse daily demand for electricity of $p = 12 - Q$, where price is in cents per kilowatt-hour and Q is in millions of KWH. The utility's cost is $C(Q) = Q^2 + 24$. (Below, derive actual numbers and show in a graph.)

A. If the monopoly cannot price discriminate, what are its profit-maximizing price and quantity? What is the deadweight loss? (10 points)

B. If the firm can perfectly price discriminate, how much output does it sell, what is the lowest price that it charges (to the "marginal consumer"), and what is the deadweight loss? (6 points)

B. 26-point problems (Answer only 2 of the 3 questions in this section)

B1. Initially, all workers are paid a wage of w_1 per hour. The government taxes the cost of labor by t per hour only in the "covered" sector of the economy (if the wage received by workers in the covered sector is w_2 per hour, firms pay $w_2 + t$ per hour). Show how the wages in the covered and uncovered sectors are determined in the post-tax equilibrium. (20 points) Compared to the pre-tax equilibrium, what happens to total employment, L , employment in the covered sector, L_c , and employment in the uncovered sector, L_u ? (6 points) [Hint: Use three side-by-side diagrams for the covered sector, the uncovered sector, and the total labor market.]

B2. Firms A and B engage in a one-period game. Each firm's profit depends on how much output both firms produce:

		Firm B	
		High Output	Low Output
Firm A	High Output	8	X
	Low Output	Y	10

A. Suppose choosing we observe many pairs of firms playing this one-period game and all firms choose to produce a high level of output. What must be true about the values of X and Y ? Be sure to explain your answer using the concept of Nash equilibrium (and, if relevant, dominant strategies). (15 points)

B. Each firm would earn higher profits if they both agreed to produce at the low output level. Why do the firms produce high levels of output in the equilibrium? (That is, explain the economic concepts behind your answer to part A). (11 points)

B3. A U.S. pharmaceutical firm sells its patent-protected drug Proagraloft in the U.S. and E.U. markets. The domestic demand function is $Q_{US} = 120 - 2p_{US}$, and the E.U. demand function is $Q_{EU} = 60 - p_{EU}$, where all prices are measured in U.S. dollars and quantity is measured in vials. The firm's marginal cost is $MC = 10$ in both countries.

A. Initially, the U.S. and EU governments prevent resale of Proagraloft. What are the firm's optimal p_{US} and p_{EU} ? How many vials does it sell in the U.S. and E.U. markets? (8 points)

B. Now assume that the U.S. and E.U. governments permit resales and per unit transportation and other transaction costs are negligible, so that the pharmaceutical monopoly can no longer price discriminate. What price will the firm charge and how many vials will it sell in the U.S. and in the E.U. markets? (10 points)

C. Use a graph to show the welfare gains and losses for U.S. and E.U. consumers and the firm. (8 points)