

Instructions: (1) Put **your name**, your **TA's** name, and section number on the exam. (2) Answer the specified number of questions in each section of the exam. You will *not* get extra credit for answering more than that number of questions (only the first ones will be counted if more than the specified number are answered). (3) To get full credit on answers, you must be clear and rigorous. Graphs should be clearly LABELLED, and you must interpret your answer in words as well. Numbers in parentheses indicate how many points various subparts of problems are worth.

A. 8-Point Questions: Answer exactly 5 questions in this section.

- A1 True, false, uncertain and why? An increase in income, holding prices fixed,
 a. necessarily leads to an increase in utility (4 points)
 b. necessarily leads the consumer to consume more of both goods. (4)
- A2 Suppose a firm has a production function of $Q = \sqrt{K + L}$ where K is capital and L is labor. If the price of capital is \$5 per unit and the price of labor is \$10 per unit, what can you say about the firm's relative use of capital and labor in production?
- A3 The government limits the amount of output that a monopoly may produce. In a graph, show the effect of this policy on price, quantity, and welfare. (6 points) Will this policy create excess demand? Why? (2 points)
- A4 With the end of the Cold War, the U.S. government decided to "downsize" the military. Along with a pink slip, the government offered ex-military personnel their choice of \$8,000 a year for 30 years or a lump-sum payment of \$50,000 immediately. The lump-sum option was chosen by 92% of enlisted personnel and 51% of officers.
 a. How would you determine the break-even personal discount rate ("interest rate") at which someone would be indifferent between the two options? [You don't have to actually solve for this interest rate—just explain how to do so using equations.] (5 points)
 b. What can you conclude about the personal discount rates of the enlisted personnel relative to those of the officers? [Which interest rates are relatively large?] (3 points)
- A5 If the government wants to maximize social welfare, should it ban some types (possibly all types) of price discrimination? Why or why not?
- A6 Alice receives a wage of w . If she chooses not to work at all, the government will give her a lump-sum welfare payment, V . She receives the welfare payment only if she chooses not to work, and does not receive it if she works. Assume that she has no other sources of income.
 a. Draw the constraints that Alice faces. (4 points)
 b. Draw a single indifference curve showing the situation in which she is indifferent between not working and taking the lump sum welfare payment, and working without receiving the welfare payment. (4 points)

B. 15-Point Questions: Answer exactly 4 questions in this section.

- B1 You have a painting that you think is valuable and that you wish to sell. You can either sell it today for \$11,000, or you can wait one year when the painter's reputation (and hence the painting's value) will have changed. If you sell it in one year you believe that there is a 25% probability the painting will sell for only \$8,000; but there is a 75% probability that the painting will be more valuable ($\$X$) than today. (Show your work:)
 a. If you are risk-neutral, how much must the painting sell for (X) in a favorable market next year in order for you to be indifferent between selling now and waiting a year? (Assume the interest and inflation rates are zero). Show your work. (4 points)
 b. Now suppose that the interest rate is 10% per year. Again, if you are risk neutral, how much must the painting sell for in a favorable market next year for you to be indifferent between selling now and waiting a year? (5 points)
 c. Given that the price the painting would sell for in a good market were as you calculated in part B, with the same probabilities and a 10% interest rate, would a risk-averse person choose to sell today or

- wait a year? Explain. (You can answer this problem even if you were unable to come up with a specific value in part B.) (6 points)
- B2** Two candidates, Al and Bill, are running against one another in the New Hampshire primary. Initially, each expects to get half the votes. Al has settled on using one of two campaign strategies: run positive ads or run negative ads. Bill has three possible strategies: run positive ads, run negative ads, or run no ads at all. Because there are only two candidates, any increase in the percentage of voters choosing Al equals a loss in the percentage of voters choosing Bill. If Al runs negative ads, he will gain 5 percentage points if Bill runs positive ads, 1 percentage point if Bill runs negative ads, and 8 points if Bill runs no ads. If Al runs positive ads, he will lose 5 percentage points if Bill runs positive ads, he will lose 2 points, if Bill runs negative ads and he will gain 10 points if Bill runs no ads at all.
- Show the payoff matrix for this game. (3 points)
 - Does either candidate have a dominant strategy? (4 points)
 - Define Nash equilibrium. (2 points)
 - Do any of the pairs of pure strategies (i.e. one for each candidate) constitute a Nash equilibrium? (6 points)
- B3** The production of paper produces a negative externality (gunk). The marginal cost to society of this externality is $MC_g = Q$. The paper supply curve based on the private marginal cost is $MC_p = 3Q$. The inverse demand curve faced by the paper-producing firm is $p(Q) = 30 - Q$. What level of production (Q) corresponds to:
- The output Q_c in the (unregulated) competitive equilibrium (2 points)
 - The output Q_o that is socially optimal (3 points)
 - The monopoly output Q_m (How does it compare to the socially optimal level?) (5 points)
 - What specific tax could the government impose on the competitive equilibrium to restrict output to the socially optimal level? (5 points)
- B4** There are two oligopoly firms in a market with identical marginal costs, m , and that produce identical outputs.
- The market demand curve is linear. In a graph, illustrate the Cournot equilibrium using best-response functions. (5 points)
 - Now, the constant marginal cost of one firm increases to $m + x$. Using the best-response functions, show how the equilibrium shifts. Justify your answer. (10 points)
- B5** A monopoly magazine's advertising revenue varies with the number of magazine subscriptions sold. The market demand curve for subscriptions is linear. The price, p , that the magazine charges others to place an ad within its magazine is aQ , where a is the price per unit of circulation and Q is the number of subscriptions sold. Consequently, the more subscriptions sold, the more the magazine earns per ad. There are n firms that are willing to place one ad per issue as long as the magazine charges aQ , where a is determined by the advertising market. The magazine has a marginal cost per subscription that is constant at m (primarily printing, paper, and mailing), and its fixed cost is F (office space, payments to its editorial staff, authors, and photographers).
- Show on a graph the monopoly subscription price and the number of subscriptions sold (p_1, Q_1). (7 points)
 - Now show what happens if the advertising rate drops (p_2, Q_2). (8 points)

Have a good summer!