Instructions: This is a closed-book, closed-notes exam. No calculators or electronic devices are allowed. Please turn off and put away all phones and other electronic devices. There are 14 multiple-choice questions and two free-response questions. Answer as many as you can in the time allowed. If you get stuck on something, I suggest moving on and coming back later when/if you have time. If you have a question, please raise your hand. Good luck!

Multiple choice – 29 out of 50 pts. (14 qns., 2 pts. each + 1)

Answer these questions on your Scantron. Your score will only be based on the marks on your Scantron. You will not receive any credit for anything written on your exam paper. You will receive 1 point for correctly writing (and bubbling in) your name, perm number, version (A,B,C, or D), and TA’s name on your Scantron.

1. Keiko has $100, but there is a 50% chance she will lose all her money in the stock market. Ndola offers to fully insure Keiko’s loss for a premium of $36. If Keiko’s utility over wealth is given by $u(w) = \sqrt{w}$, which of the following is true?

   I. Keiko should accept Ndola’s offer
   II. Ndola will have positive expected profit if Keiko accepts

   (a) Both
   (b) Just I
   (c) Just II
   (d) Neither

2. Oxnard has a competitive market for strawberries. The inverse demand for strawberries is $p = 12 - \frac{q}{5}$ and the supply is $q = 10 + 5p$. What is the equilibrium price and quantity?

   (a) $(p, q) = (12, 70)$
   (b) $(p, q) = (5, 35)$
   (c) $(p, q) = (24, 7)$
   (d) $(p, q) = (10, 3.5)$

3. Manglomerate has a monopoly on mangoes in India. It has no fixed costs and faces a marginal cost of 2. The inverse demand for mangoes in India is $p = 10 - q$. What are the company’s profits?

   (a) 9
   (b) 24
   (c) 16
   (d) 21

4. (cont. from above) A blight kills all the mango trees in the US, so the US opens up its market to imported mangoes and Manglomerate begins selling as a monopolist in the American market as well. The inverse American demand for mangos is $p_a = 16 - \frac{qa}{2}$. If it engages in multimarket price discrimination, how does the US price compare to the price in India?

   (a) The US price is 1 lower
   (b) The US price is 3 higher
   (c) They are the same
   (d) The US price is 2 lower
5. The inverse demand function for passenger airplanes is \( p = 300 - 3Q \), where \( Q \) is the total quantity of airplanes. Two airplane manufacturers, Boeing and Airbus operate as duopolists, both with \( MC = 30 \). If the firms acted as Cournot duopolists, how many airplanes would each firm produce? If instead, Boeing was the leader, and Airbus was the follower, how many planes would Boeing produce in a Stackelberg equilibrium?

(a) Cournot: \( q_i = 20 \); Stackelberg: \( q_1 = 30 \)
(b) Cournot: \( q_i = 90 \); Stackelberg: \( q_1 = 135 \)
(c) Cournot: \( q_i = 60 \); Stackelberg: \( q_1 = 90 \)
(d) Cournot: \( q_i = 30 \); Stackelberg: \( q_1 = 45 \)

6. In an exchange economy, there are 100 total units of \( x \) and 100 total units of \( y \). The two consumers have utility functions \( U^A(x, y) = x^2 y \) and \( U^B(x, y) = xy \). What is the equation of the contract curve?

(a) \( y^A = \frac{100x^A}{300-2x^2} \)
(b) \( y^A = 2x^a \)
(c) \( y^A = \frac{100x^A}{200-2x^2} \)
(d) \( y^A = 3x^a \)

7. In an exchange economy, person \( A \) is endowed with 120 units of good \( x \) (and none of good \( y \)), and person \( B \) is endowed with 120 units of good \( y \) (and none of good \( x \)). \( A \) has utility \( U^A(x, y) = x + y \) and \( B \) has utility \( U^B = \min\{x, 2y\} \). At the competitive equilibrium, what is the value of \( x^A \)?

(a) 40
(b) 80
(c) 20
(d) 60

8. Ben and Wendy both like to snowboard, but Wendy has a real job and when Ben is out playing in the mountains, Wendy is stuck at work. Ben’s utility is \( U_B(s) = s - \frac{s^2}{2} \), where \( s \) is the number of hours he spends snowboarding. Wendy’s utility, as a function of the number of hours Ben spends snowboarding is \( U_W(s) = 2 - \frac{s^2}{2} \). Assume that Ben has a season pass to his favorite ski resort, so the marginal cost of an extra hour snowboarding is zero. What is Ben’s optimal number of hours to spend snowboarding? How many hours would Wendy like for him to spend snowboarding.

(a) \( s = 1/2 \) for Ben; \( s = 0 \) for Wendy
(b) \( s = 1/2 \) for Ben; \( s = 1/2 \) for Wendy
(c) \( s = 2 \) for Ben; \( s = 1 \) for Wendy
(d) \( s = 1 \) for Ben; \( s = 0 \) for Wendy

9. (Continued from above) What is the Pareto optimal level of \( s \)?

(a) \( s = 1/3 \)
(b) \( s = 1 \)
(c) \( s = 1/2 \)
(d) \( s = 0 \)
10. Firm 1 produces output $x$ with a cost function $C_1(x) = x^2/200$. Firm 2 produces output $y$ with a cost function $C_2(x, y) = y^2/100 - 2x$. Both firms face competitive product markets, with respective prices $p_x = 4$ and $p_y = 5$. At what rate should $x$ be taxed or subsidized if the government wants the firms to produce the socially optimal level of each good?

(a) Tax of 2 per unit of $x$
(b) Tax of 400 per unit of $x$
(c) Subsidy of 1200 per unit of $x$
(d) Subsidy of 2 per unit of $x$

11. White truffles are a very prized and rare edible fungus that grow naturally in the countryside near Alba, Italy. Suppose that it costs $200 per day to search for white truffles. On an average day, the total number of white truffles ($T$) found in Alba is $T = 20x - x^2$, where $x$ is the number of people searching for white truffles on that day. White Truffles can be sold for $100 each. If there is no regulation, how many more people will be searching for white truffles than the socially optimal number?

(a) 8
(b) 18
(c) 9
(d) 0

12. In the problem above, suppose that the town of Alba could require that truffle hunters buy a daily permit in order to search for truffles in the area. What should Alba charge for a permit, so that the optimal number of truffles are found?

(a) $400
(b) $200
(c) $900
(d) $100

13. During the summer, Juan mows the field behind his house. Mowing improves the view for Juan and his neighbor. Juan’s marginal benefit of mowing is $30 - m$, where $m$ is the number of minutes Juan spends mowing. His neighbor’s benefit is $40 - 2m$. The marginal cost of mowing is 10. What is the efficient level of provision of mowing services?

(a) 10 minutes
(b) 15 minutes
(c) 20 minutes
(d) 5 minutes

14. The government of the city of Goleta will use a VCG mechanism to determine whether or not to install a lighthouse at Coal-Oil Point. Five agencies participate in the VCG and have the following net-valuations for the lighthouse: 1) The Coastal Conservancy ($-40$) 2) The UCSB administration ($-40$) 3) The Associated Students of UCSB ($+20$) 4) The Squid-Jigger’s Union ($+30$) 5) Oprah ($+40$). What will be the outcome of the mechanism?

(a) Lighthouse not approved; CC and UCSB admin each pay 10
(b) Lighthouse approved; Oprah and SJU each pay 10
(c) Lighthouse approved; AS pay 10, SJU pays 20, Oprah pays 30
(d) Lighthouse not approved; no one pays any tax
1. Consider an exchange economy consisting of two people, $A$ and $B$, endowed with two goods, 1 and 2. Person $A$ is initially endowed with $\omega^A = (4, 4)$ and person $B$ is initially endowed with $\omega^B = (1, 6)$. They both have preferences given by $U(x_1, x_2) = x_1 x_2^3$. (Points split equally across parts)

(a) Write the equation of the contract curve (express $x_2^A$ as a function of $x_1^A$)

(b) Let $p_2 = 1$ and find the competitive equilibrium price $p_1$. To obtain partial credit for an incorrect answer, you should write down a condition that must hold when person $A$ is choosing the optimal allocation given the prices she faces.

(c) Find the competitive equilibrium allocations, $x^A = (x_1^A, x_2^A)$ and $x^B = (x_1^B, x_2^B)$

(d) Now suppose that the two people began with the same endowments, but $B$’s preferences instead were $U(x_1, x_2) = 2x_1 + 3x_2$. How would the price and allocations change?

(e) In which case does $B$ gain more from trading with $A$— when $U^B(x_1, x_2) = x_1 x_2^3$ or when $U^B(x_1, x_2) = 2x_1 + 3x_2$? Briefly explain.

2. The citizens of Quietville (population: 3) lack recreational opportunities. The town council is thinking about creating some public parks, which the town is currently lacking, but does not know how many acres to devote to parkland, if any. The total cost of converting $x$ acres of land into a park is $18x$. The town council cannot observe directly individuals’ demand for parkland. (Points indicated in brackets.)

(a) [4] Suppose that for the three residents of Quietville ($A$, $B$, and $C$), the total benefit of $x$ acres of parkland is $B^A = 30x - \frac{15x^2}{2}$ for person $A$, $B^B = 4x - x^2$ for person $B$, and $B^C = 2x - \frac{x^2}{2}$ for person $C$. If Quietville’s leaders could observe the benefit of parkland for each person, what would be the socially optimal number of acres of parkland?

(b) [2] Suppose that the town council identifies only a single, 1 acre lot and is trying to decide whether or not to build a park on that lot. Not being able directly to observe the marginal benefit to the three residents, the town council submits a plan to build a park on that one acre and split the cost of doing so (18) evenly among the three residents. What is the net valuation of this plan for each of the three citizens?

(c) [2] If the residents voted on this plan, would it be approved by a majority? Who will vote for and who will vote against?

(d) [2] Now suppose that the council use a VCG mechanism to determine whether or not to build the 1 acre park. Will the park be approved and what taxes will be paid by whom?