HOWARD UNIVERSITY

DEPARTMENT OF ECONOMICS

CODE NUMBER _____ TOTAL NUMBER OF PAGES____

DATE_____

COMPREHENSIVE EXAMINATION: Fall 2016 Microeconomics Theory PhD

EXAMINERS:

1. **Dr. Omari H. Swinton ,Chairperson**
2. **Dr. Emily Blank**
3. **Dr.ZhunXu**

1. **The examination is scheduled between the hours: 9:30 a.m-1.00 pm**

   ALL STUDENTS ARE TO BE SEATED BY 9:15 a.m.
2. **YOU ARE REQUIRED TO ANSWER ONLY FIVE (5) QUESTIONS.**

   Any additional questions answered over the required number from each category will NOT receive credit.
3. **Correct answers to questions NOT asked will receive NO credit.**
4. **Be sure to write the Code Number assigned to you in the TOP LEFT HAND CORNER OF THIS SHEET AND ON EACH ANSWER SHEET. DO NOT WRITE YOUR NAME ON ANY SHEET OF THE EXAMINATION.**
5. **Begin each question on a new page. Number each page used in sequence. Write only on one side of the paper.**
6. **Write clearly and illustrate your answers with graphs whenever and wherever possible.**
7. **USE ONLY BLACK INK PENS.**
8. **At the end of the examination, please indicate the total number of pages being submitted in the space provided in the TOP RIGHT HAND CORNER of this sheet.**

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1. **Bring your pens, pencils, calculators and rulers.**
2. **No briefcases, book bags or sacks, no handbags larger than 10 x 6 of any form are to be brought into the examination room.**
3. **No books, notes or other study material are to be brought into the examination room.**
4. **During the Examination there is to be no communication between or amongst students for any purpose. All questions must be directed to and channeled through the faculty member conducting the examination.**
5. **Only the scrap paper provided by the proctor is to be used for the examination. Scrap paper should bear the code number assigned to each student, and be handed over to the proctor along with the examination.**
6. **Students are not expected to leave the examination room before completing their examination and turning it in to the proctor.**
7. **NO FOOD OR SMOKING is permitted in the examination room.**
8. **It is the student's responsibility to remove any coffee or water containers taken into the examination room.**
9. **NO CELL PHONES ARE ALLOWED.**
10. **EXAMINATION RESULTS WILL ONLY BE GIVEN TO STUDENTS WHO ARE REGISTERED.**

CODE NUMBER_____

STUDENTS: PLEASE CIRCLE ONLY THE QUESTIONS ANSWERED AND PROVIDE THE PAGE NUMBERS.

QUESTIONS	PAGE NUMBERS
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	

1. Duality
   Let u(x,y)=(x+2)y. Find the following
   a. the Marshallian demand functions for x and y
   b. the indirect utility function
   c. the compensated (Hicksian) demand functions for x and y
   d. the expendeiture function
   e. Use your answers to a and d to derive the Hicksian demand functions for x and y. Compare these to your answers to c. Explain what you are doing.
   f. Use your answers to b and c to derive the Marshallian demand functions. Compare these to your answers for a. Explain what you are doing.
   g. Write the Slutsky equation for this problem.

2. Consider a symmetric independent private values setting with two buyers. The seller owns an indivisible object which she is commonly known to value at zero. Suppose that $v_i \in \{1,2,3\}$ for $i = 1,2$, and that each realization is equally likely (i.e., occurs with the probability 1/3). Suppose also that $S_i = \{NO, 1, 2, 3\}$ for for$i = 1,2$. That is a bidder may choose not to participate or he may bid one of his three possible valuations. Finally, suppose that ties in bidding are broken randomly without bias.
   a. Suppose the seller announces a second-price sealed bid auction with reserve price of 1. Find a symmetric Bayesian Nash Equilibrium (BNE), $b^*(v)$, in which the bidders play weakly dominant strategies. How much expected revenue is generated in this BNE?
   b. Suppose the seller announces a second-price sealed bid auction with reserve price of 1. Find an asymmetric BNE, $(b_1(v_1), b_2(v_2))$.
   c. Suppose the seller announces a first-price sealed-bid auction with reserve price of 1. Find the symmetric BNE, $b^{**}(v)$ which generates the highest expected revenue. How much revenue is generated in the BNE?
   d. Suppose the seller announces an all-pay auction with a reserve price of 1. Find a symmetric BNE, $b^{***}(v)$. How much expected revenue is generated in this BNE?

3. You and a fellow student are working on a joint project in a course. You each know that your project's score in points will be split between the two of you. The project's score depends on the level of effort you put into the project, where your effort, $e \in [0,1]$, ranges between zero and one. Putting forth effort is costly to you, though: you feel a cost of effort given by $c(e)$. Your partner faces the same cost function for her own effort.
   a. Suppose the score earned by the project is given by $f(e_1,e_2)=200\, e_1e_2$, and your cost of effort is given by $c(e_1,)=40e_1$. What is the effort chosen by you and your partner, and what is your score on the project? (Hint: You need to use best-response graphs on this one. The first-order conditions in this problem will only help you draw the best-response function of each player. Find the Nash equilibria by finding the intersections of the best-response functions.)
   b. Now suppose the score earned on the project is given by $f(e_1,e_2)=200\, e_1e_2$ and the cost of your effort is given by $c(e_1,)=150(e_1)^2$. What is the effort chosen by you and your partner, and what is your score on the project? (The hint on Part A still applies here.)

4. Suppose that an amusement park is a local monopoly. It has daily fixed costs of $30,000 and marginal cost of zero. There are 1000 identical people who wish to visit the park each day. The preferences of a typical park visitor are defined over the number of rides x he "consumes" and the number of dollars m left in his pocket at the end of the day. These preferences are represented by the utility function $U(x,m) = 10\, x - x^2/4 + m$. Suppose that each visitor comes to the park with I=200 dollars in his pocket.
   a. If p is the price of rides, what is a typical park visitor's budget constraint over bundles (x,m)?
   b. What is a typical park visitor's demand function for rides, $x^*(p)$? Sketch this function in a graph, being sure to label the vertical and horizontal intercepts. What is the market demand for rides?
   c. Suppose the amusement park operates as a "simple"' monopolist (i.e., charges a linear price for rides). What price, p^*, will it set? (Depict p^* in your graph.) How much profit, π^*, will it earn? How much consumer surplus, CS^*, will each consumer enjoy? How much per capita dead-weight loss is generated, DWL^*?
   d. Suppose the monopolist practices second-degree price discrimination by charging each visitor an entry fee, Φ, and a price per ride of p. What price for rides, p^{**}, will the park set? What entry fee, Φ^{**}, will it set? How much profit, π^*, will it earn? How much consumer surplus, CS^{**}, will each consumer enjoy? How much per capita dead-weight loss will be generated, DWL^{**}?

5. A recent Duke graduate has opened a factory for production of textbooks in Durham. The production function is as follows

$$f_d(K;L) = K^{1/3} L^{1/3}$$

Currently, she uses K = 2000 and L = 500 and the rental rates of capital and labor are w=r=$1. Now she is considering expanding her business and opening another factory in Chapel Hill. Using her microeconomic skills, she estimates that the cost function for the factory in Chapel Hill will be

$$C_h(q) = q^{3/2}$$

The firm is facing a competitive market and the price at which it can sell its output is p = $30.

a. Suppose that in the short-run, both inputs in the Durham factory are fixed. What would be the profit maximizing output in the Chapel Hill factory? What would be the total output Q_{SR} of the firm? Calculate the profit π_{SR} that the firm will make in the short run.
b. In the long run, both capital and labor are adjustable. Find the long-run cost function $C_d(q)$ for the factory in Durham.
c. Suppose that the firm wants to produce Q units in total from the two factories in the long-run. How should production be allocated between the two factories in order to minimize the cost of production? Find the total cost $C_{LR}(Q)$ associated with this allocation.
d. How much output Q_{LR} would the firm choose to produce in the long-run given p = $30? What would be the firm's profit π_{LR}? How does this compare to the short-run profits you found in part b?
e. Describe the changes that took place in order to reach the long run equilibrium.

6. Sarah and Clare have identical utility functions U = 5 ln(x)+y: Sarah starts out with 16 units of x and 5 units of y and Claire starts out with 4 units of x and 15 units of y.
   a. Draw the Edgeworth box, label the endowment point and sketch some "normal" indifference curves through the endowment point. Shade the region where trades are possible.
   b. Find Sarah and Claire's Marshallian demands as a function of the price of x, price of y and their endowments.
   c. Find the market clearing price and how much x and y the two consumer after trading.
   d. Who is happier after trading?

7. An isolated village surrounded by wilderness contains a cultivated banana grove. Bananas (b) are the only consumption good; the number of villagers working in the grove is Lg. The grove produces bananas by: $B_g = 12L_g - L^2_g$. Bananas also grow in the wilderness by: $B_w = 2L_w$. The village has 12 identical workers; none of them desires leisure and no other resources or products need beconsidered.
   a. As a benevolent dictator, how would you divide the 12 laborers between grove and wilderness to maximize banana output?
   b. Compare the results if the grove were instead "un-owned" property, so that any villager can enter and pick what he pleases?

8. Suppose that you are able to consume only two goods, coffee and donuts. Use a graphical and written analysis to answer the following questions.
   a. Draw your budget constraint for coffee and donuts. Please put donuts per week on the y-axis and cups of coffee per week on the x-axis. Label all axes. Illustrate the optimal bundle E.
   b. Suppose you learn that coffee will prolong your life. Illustrate this new information on the budget constraint in your graph. Identify the new equilibrium bundle E'.
   c. Do you now drink more or less coffee than before the new information? Why?
   d. Are you better off, worse off, or as well off at the new equilibrium as the old? How can you be sure of your answer?