

BEEM101

UNIVERSITY OF EXETER

BUSINESS SCHOOL

(MOCK) JANUARY 2020 EXAM

MICROECONOMICS

MODULE CONVENOR: DAVID REINSTEIN

DURATION: TWO HOURS

There are THREE parts to this exam, please follow the instructions for each part carefully.

Part A is worth 38 marks (points)

Part B is worth 22 marks (points)

Part C is worth 40 marks (points)

Answer ALL MCQ questions in Part A on the MCQ sheet provided.

Choose ONE of the questions in Part B, answering all parts of this question.

Choose ONE of the questions in Part C and follow the instructions given in this question.

Remember to enter both your Student ID number and **candidate number** on the MCQ sheet as well as the answer booklet, as instructed; failure to do so may delay the release of exam results.

Materials to be supplied: MCQ Answer Sheet.

Materials to be supplied on request: None.

Approved calculators are permitted.

This is a closed note paper.

Part A: Multiple choice (note: some of these questions require computation)

Part A contains 10 questions worth 38 marks (points) in total. Not all of these questions are worth the same amount: this is clearly indicated below.

Note: Each question has at least one correct answer, and maybe more, unless otherwise indicated. For each question, partial credit will be awarded according to the formula $\max(0, X)$ where X is ‘share of correct answers chosen’ minus ‘share of incorrect answers chosen.’ (Note that this implies that you can never get *negative* marks for a question.) This is as discussed in lecture and practice problems.

Answer ALL questions in Part A on the MCQ sheet provided.

1. (3 points) *Choose ONE.* Suppose that in 2010 every family in the town of Slough bought a single ticket in a lottery. The lottery awarded 100 prizes of £10,000 by random draw. Suppose that, a researcher was able to contact each of these families in the year 2017 and accurately measure the number of pets for each household. (Suppose that each of these families remained intact, e.g., no deaths or divorces, and none of them left Slough.) They connected this to data on whether the family won the lottery. They found that families that won the lottery had 1.3 more pets on average than families that did not win (and the difference was strongly statistically significant). Which of the following statements is reasonable?
 - (a) This provides strong evidence that owning pets cause people to live longer.
 - (b) This suggests that the pets might be a normal (rather than an inferior) good for most people, but this is not definitive, as the people who happen to be wealthy may simply have different tastes for pets.
 - (c) If we knew that ‘owning a pet’ was completely randomly determined (e.g., pets were given away only by lottery), this may be evidence that owning pets cause people to live longer.
 - (d) This provides evidence that pets and income are complements.

Solution: This suggests that the pets might be a normal (rather than an inferior) good, but this is not definitive, as the people who happen to be wealthy may simply have different tastes for pets.

Discussion: the ‘normality’ of a good is about how an *individual’s* consumption of that good would differ if he/she had greater wealth. On the other hand if wealthy people happen to come from pet-loving backgrounds, this tells us nothing about the ‘Engel curve’ or income elasticity of pet ownership.

If we knew that ‘owning a pet’ was completely randomly determined (e.g., pets were given away only by lottery), this may be evidence that owning pets cause people to live longer.

Discussion: We may not know the channel of this effect (‘why and how’), but if pet ownership was indeed randomly determined, then something about winning the pet lottery, and thus owning must have lead to the lower rate of mortality.

2. (4 points) (*Choose ONE*) Suppose an individual’s MRS (of steak for beer) is 2:1. That is, at the current consumption choices he or she is willing to give up 2 beers to get an extra steak. Suppose also that the price of a steak is £1 and a beer is 25p. Her utility function is ‘Cobb-Douglas’. Then in order to increase utility the individual should

- (a) Definitely buy more steak and less beer.
- (b) Maintain the current level of consumption.
- (c) Definitely buy more beer and less steak.
- (d) Not enough information to answer the question; if she is consuming only beer this would be optimal, otherwise not.
- (e) Not enough information to answer the question; if she is consuming only steak this would be optimal, otherwise not.

Solution: Definitely buy more beer and less steak.

Note that as this function is Cobb-Douglas it can *not* be the case that she would have such a MRS if she consumed only one or the other good. (The MRS goes to infinite with Cobb-Douglas, the 'absolute necessities' case.

3. (3 points) *Choose TWO.* Under which of the following cases will there be ZERO substitution effect of a small price change?

- (a) $U = \log(X) + Y$
- (b) $U = \min(2X, 3Y)$
- (c) $U = X + Y$, starting at the point where $P_X = P_Y$
- (d) $U = X + Y$, starting at the point where $P_X = 2P_Y$
- (e) $U = X^{1/2}Y^{1/2}$

Solution: $U = \min(2X, 3Y)$ and $U = X + Y$, starting at the point where $P_X = P_Y$

4. (3 points) *(Choose all that are correct, and no more.)*

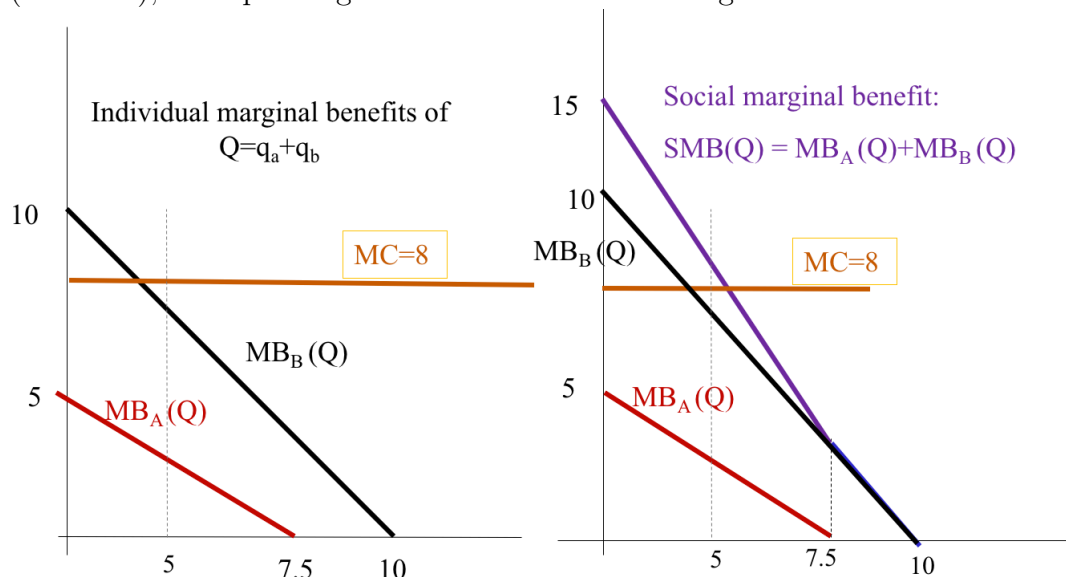
Under perfect competition, with equilibrium prices

- (a) an equitable allocation of the available resources will always result.
- (b) the outcome will definitely not be Pareto optimal, even if there are no market failures.
- (c) there is no reason to expect that voluntary trading will result in an equitable allocation of the available resources.
- (d) there will be shortages of some goods, balanced by surpluses of other goods.
- (e) wages for each type of labour will be paid an amount equal to its marginal productivity in every production process it is used in.

Solution: there is no reason to expect that voluntary trading will result in an equitable allocation of the available resources.

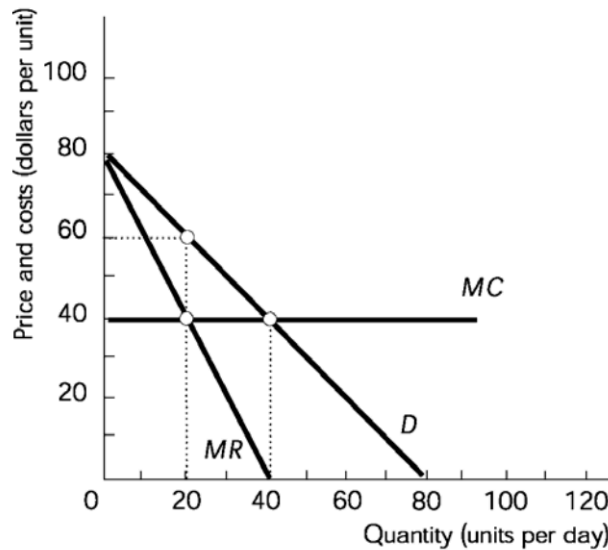
wages for each type of labour will be paid an amount equal to its marginal productivity in every production process it is used in.

5. (3 points) *Choose ONE.* Consider the figure below, depicting the marginal benefit curves for the two consumers in the economy (A and B), as well as the social marginal benefit and marginal cost curves ($MC = 8$), for a public good. Which of the following are correct?



- (a) If B believes A will provide none of the public good, B's best response is to also provide none.
- (b) The socially optimal level of this public good is an amount between 5 and 7.5 units.
- (c) If A believes that B will provide none of the public good, A would best respond by providing a positive amount of the public good.
- (d) If B believes that A will provide none of the public good, A would best respond by providing *more* of the public good than would be socially optimal.

Solution: The socially optimal level of this public good is an amount between 5 and 7.5 units.



6. (3 points) The figure above depicts the demand curve, marginal revenue curve, and marginal cost curves for a monopoly. Which of the following is correct:

- (a) The monopoly maximises its profit by charging $p=60$, yielding no deadweight loss
- (b) The monopoly maximises its profit by charging $p=40$, yielding a deadweight loss of 200
- (c) The monopoly maximises its profit by charging $p=60$, yielding a deadweight loss of 200
- (d) The monopoly maximises its profit by charging $p=40$, which also minimises deadweight loss
- (e) The monopoly maximises its profit by charging $p > 60$, yielding a deadweight loss greater than 300

Solution: The monopoly maximises its profit by charging $p=60$, yielding a deadweight loss of 200

7. (5 points) (*Choose all that are correct, and no more.*) Which of the following are FALSE?

- (A) Both second and third-degree price discrimination will always lead to a greater quantity exchanged.
- (B) For third-degree price discrimination to improve total welfare it must lead to an increase in the quantity exchanged (this is a necessary condition)
- (C) The ability to price discriminate may reduce the profits of a monopolist
- (D) Under second-degree price discrimination the consumer who values the good MORE than the other consumer will purchase less than the efficient quantity or quality of the good
- (E) Both second and third-degree price discrimination involve self-selection by consumers, as the firm cannot identify any attributes of the consumer in either case without the consumer voluntarily disclosing these
- (F) Price discrimination based on cookies and 'time of arrival' on a webpage will be perfect price discrimination

Solution:

Only one statement is true, the remainder are false. (With these instructions, be sure to fill in the bubbles for the false statements only)

FALSE: 'The ability to price discriminate may reduce the profits of a monopolist.'

Note that the ability to price discriminate will never reduce the monopoly's profits, and will potentially allow these to increase. Remember, the firm could always ignore this tool if it is not helpful.

FALSE: 'Under second-degree price discrimination the consumer who values the good MORE than the other consumer will purchase less than the efficient quantity or quality of the good'

No, it is the reverse. The quality/quantity are distorted downwards for the consumer who values the good LESS; this is to prevent the more valuable consumer from choosing this cheaper bundle.

FALSE: 'Both second and third-degree price discrimination involve self-selection by consumers, as the firm cannot identify any attributes of the consumer in either case without the consumer voluntarily disclosing these'

This describes second-degree price discrimination but not third-degree price discrimination, where the category of consumer CAN be identified

FALSE: 'Price discrimination based on cookies and 'time of arrival' on a webpage will be perfect price discrimination.'

This may combine second and third-degree price discrimination and it may yield a different price being paid by each consumer. However, this will not allow the seller to perfectly mind read and determine every consumers exact willingness to pay.

TRUE: 'For third-degree price discrimination to improve total welfare it must lead to an increase in the quantity exchanged (this is a necessary condition)

As 3dpd reduces exchange efficiency (some people may obtain the good who value it less than others who do not obtain the good), we need an increase in quantity (improving top-level efficiency) to potentially make up for this.

8. (4 points) *Choose ONE.* Consider the choice between two binary lotteries A and B . Lottery A will pay A_1 with probability p and A_0 with probability $1 - p$, where $A_1 > A_0$. Lottery B will pay B_1 with probability q and B_0 with probability $1 - q$, where $B_1 > B_0$. Each lottery costs the same amount to obtain. Assume all people prefer more money to less money. Which of the following is true?
- (A) If each lottery is a coin flip, i.e., $p = q = 1/2$, and $A_0 = B_0 = 0$, a risk-averse person will choose lottery A if $A_1 > B_1$.
 - (B) A risk-neutral individual will always choose the lottery with the smaller difference between the high and low payoffs.
 - (C) A risk-averse person will always choose the lottery with the lower payoff variance, regardless of expected monetary value.
 - (D) A risk-loving person will always choose the lottery with the greater expected monetary payoff.
 - (E) None of the above.

Solution: If each lottery is a coin flip, i.e., $p = q = 1/2$, and $A_0 = B_0 = 0$, a risk-averse person will choose lottery A if $A_1 > B_1$. (Note, A risk-neutral person would do so as well).

9. (4 points) (*Choose all that are correct, and no more.*)

In a repeated game, consider the profile of strategies \mathbf{P} ‘both players repeatedly play a strategy that is part of the same stage-game Nash equilibrium’...

- (a) If the stage-game has only a single Nash equilibrium, then \mathbf{P} must be the *only* subgame perfect Nash equilibrium, even if the game is repeated indefinitely
- (b) \mathbf{P} will always be a subgame perfect Nash equilibrium
- (c) If the stage-game has multiple equilibria, then there may be multiple subgame perfect Nash equilibria in the repeated game, including some involving play in certain stages that is *not* part of a stage-game Nash Equilibrium
- (d) If the stage-game has only a single Nash equilibrium, there can be subgame perfect equilibria other than \mathbf{P} if people are not too patient and the game is infinitely repeated.

Solution: \mathbf{P} will always be a subgame perfect Nash equilibrium

AND If the stage-game has multiple equilibria, then there may be multiple subgame perfect Nash equilibria in the repeated game, including some involving play in certain stages that is *not* part of a stage-game Nash Equilibrium

Note: For the final choice, we need that people ARE patient to potentially sustain a subgame perfect NE other than \mathbf{P} .

10. (5 points) (*Choose all that are correct, and no more.*) Consider the below game; note the payoffs for player 1 (the row player) are given in the lower-left of each box, and the payoffs for player 2 (the column player) are given in the upper-right of each box. Which of the following are true?

G_0	a_1	a_2	a_3
a_x	5,3	4,0	2,3
a_y	2,5	1,3	1,0
a_z	4,4	4,4	0,5

- (a) Neither player has a strictly dominant strategy.
- (b) There is no Nash equilibrium of this game in pure-strategies.
- (c) For the row player a_x is the only *rationalisable* strategy.
- (d) For the column player all strategies are rationalisable.

Solution: We eliminate a_y which is dominated by a_x . After this, a_2 is strictly dominated by a_3 in the remaining part of the game. Finally, a_x dominates a_z in the remaining game.

TRUE: Neither player has a strictly dominant strategy. (While a_x and a_3 are weakly dominant, none are strictly dominant)

FALSE: There is no Nash equilibrium of this game in pure-strategies. $\{a_x, a_1\}$ and $\{a_x, a_3\}$ are NE.

TRUE: For the row player a_x is the only *rationalisable* strategies

FALSE: For the column player all strategies are rationalisable.

Part B: Analysis, brief discussion

Part B: Answer *ONE* of the two questions below, answering all parts of the chosen question.

1. (22 points) *This question involves Game Theory*

If you choose this question, please answer all parts (a-d).

Suppose that ...

- (a) (6 points) Compute and draw the best-response functions in this game. Explain...
- (b) (4 points) Derive the Nash equilibrium; ...What are ...?
- (c) (7 points) What is the level of ...
- (d) (5 points) Suppose What amount would he offer? Would this ...?

2. (22 points) *This question involves uncertainty, insurance, and game theory.*

If you choose this question, please answer all parts (a-d).

Setup ...

- (a) (4 points) What is the expected monetary value ...? What is ...expected utility?
- (b) (9 points) What is the maximal amount that XXX would be willing to pay ...? Show using a diagram that ...
- (c) (9 points) Consider the ‘game’ described below.

...

What is/are the Nash equilibria of this sequential game? What is the subgame-perfect Nash equilibrium...? How might this differ if...’xxx preferences’?

Part C: Analysis, discussion

Part C: Answer only *ONE* of the three questions below. For the question you choose, please follow the instructions carefully. There are 40 marks available for Part C. Please write *clearly* and concisely.

1. (40 points) *This question is about the provision of public goods. If you choose this question answer **all** parts (a), (b), and (c).*

Consider an economy with Suppose each individual...

- (a) (12 points) Derive the ...
- (b) (12 points) Derive the ..., showing your work and explaining the steps taken.
- (c) (16 points) Discuss the.... What explains this ...? Could government intervention ...? In the real world ...?

2. (40 points) *This question is about hidden information in the principal-agent setting.*

NOTE: we may not have time to cover this material in lecture; only choose this question if you have studied this carefully and are confident.

If you choose this question answer *all* parts (a), (b), and (c).

- (a) (11 points) What ...mean ...in this context? What does ...mean in this context? If ..., which ...will ...and why?
- (b) (14 points) Assuming ..., separating equilibrium', describe ... In doing so, explain what you mean by
- (c) (15 points) Describe the ...described in part (b). Derive an expression for the Will either ...? Explain why or why not. Will this cause ...? Explain.

3. (40 points) *This question involves a variety of topics.*

If you choose this question answer *ANY TWO* of the five parts (a-e) below. Try to answer each part in less than one and a half sides of a page (i.e., a total of three pages for both parts), plus any necessary diagrams.

(a) (20 points) Define the concept of [something game theory].... Why and when should we expect ...? Specify a game where:

- (first condition,)
- (second condition,)
- however (third condition.)

For the game you specify, carefully show..., and explain your answer.

(b) (20 points) When will ...increase or decrease social welfare? Discuss, considering

(c) (20 points) Explain why ...leads to a less-efficient outcome in the context of [cited paper]. Discuss a market where we may see such an outcome in the real world.

(d) (20 points) Discuss how economists attempt to measure individual Explain the arguments for these techniques as well as the critiques of these methods.

(e) (20 points) Discuss the theory and evidence on [topic involving charity] ...in making their ...choices, and how they process this information.

END OF PAPER