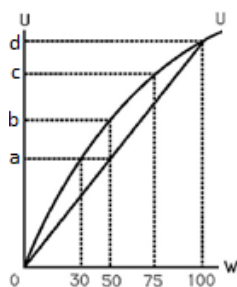




1. Which of the following is true?
  - a) A player has at most two dominant strategies.
  - b) If a player has two dominant strategies, one of them is a mixed strategy.
  - c) A player may have two best responses (optimal strategies) to the other player's strategy.
  - d) If a player has two best responses to the other player's strategy, one of them is a mixed strategy.
2. A pair of strategies obtained by backward induction (from the end to the beginning) in a sequential game:
  - a) Cannot be a Nash equilibrium.
  - b) Has to be a Nash equilibrium.
  - c) Is a pair of dominant strategies.
  - d) Cannot be a pair of dominant strategies.
3. In an equilibrium in a finitely-repeated prisoner dilemma:
  - a) The outcome in each repetition is the same as it would be in the non-repeated game.
  - b) The outcome in every repetition is Pareto-efficient.
  - c) The outcome in some repetitions is Pareto-efficient.
  - d) None of the other alternatives is correct.
4. The Cournot equilibrium:
  - a) Is an equilibrium in dominant strategies.
  - b) None of the other alternatives is correct.
  - c) Is an equilibrium in a sequential game.
  - d) Is a Nash equilibrium.
5. JJ used to be a cautious driver. But now that he bought collision insurance he started driving dangerously for the thrill of it. This behaviour typically leads to:
  - a) Moral hazard.
  - b) Adverse selection.
  - c) Zero economic profits for the insurance company.
  - d) Actuarially fair insurance premia.
6. If firms face asymmetric information in the labour market, there will be a pooling equilibrium in wages if:
  - a) Firms can tell differently abled workers.
  - b) All workers earn above-average wages.
  - c) Equally abled workers are paid different wage rates.
  - d) Differently abled worker are paid the same wage rate.
7. If an agent is risk averse:
  - a) Utility of the expected value of a risky situation is higher than the expected utility of the risky situation.
  - b) Expected wealth is less than the initial wealth.
  - c) None of the other alternatives is correct.
  - d) He is willing to buy expensive full-coverage insurance.
8. The figure shows JJ's utility from wealth. He has €100, but may lose it with probability 50%. Then the  $a$  in the figure denotes:
  - a) The expected utility of a lottery with expected value €30.
  - b) The utility of €50 with certainty.
  - c) The expected utility of losing €100 with 50% probability and not losing anything with the remaining 50%.
  - d) Nothing, as it is not on the utility curve.



9. If producing a good gives rise to a negative externality there will be an inefficiency because:
  - a) The price of the good will be too high.
  - b) The private cost of the good includes costs that are not opportunity costs.
  - c) Too much good will be produced and consumed
  - d) Demand for the good becomes too elastic.
10. If producing a good gives rise to a negative externality:
  - a) Private marginal cost exceeds marginal social cost.
  - b) Profit maximisation leads to excessive output.
  - c) Marginal benefit from the good is increasing.
  - d) Social welfare is maximised when polluting firms produce until their marginal private cost is zero.
11. Pollution is a negative externality, so social welfare is maximised when:
  - a) All pollution is eliminated.
  - b) Some pollution is eliminated.
  - c) There is no regulation.
  - d) Polluting firms produce until their marginal cost is zero.
12. Production of a good creates a positive externality. To correct this the government should:
  - a) Ban production of the good.
  - b) Tax production of the good.
  - c) Subsidise production of the good.
  - d) Set the output level so that marginal benefit is zero.
13. Efficient provision of a public good requires that all individuals pay:
  - a) The same.
  - b) The same fraction of their individual income.
  - c) Their marginal willingness to pay for the public good.
  - d) None of the other statements is correct.
14. Everyone consumes a private and a public good. The marginal cost of the private good is €2; that of the public good is €10. Provision of the public good will be efficient if (measuring the public good on the horizontal axis):
  - a) The sum of the marginal rates of substitution is 5.
  - b) Each marginal rate of substitution is 5.
  - c) Each marginal rate of substitution is 10.
  - d) None of the other statements is correct.
15. If a public good is funded by voluntary contributions, free-riding will cause provision of the public good to be:
  - a) Zero.
  - b) Pareto efficient.
  - c) Less than the Pareto-efficient provision.
  - d) None of the other statements is correct.
16. Assuming the usual representation of demand curves (price in the vertical axis, quantity in the horizontal axis), the aggregate demand curve for a public good is:
  - a) The horizontal sum of individual demand curves.
  - b) The vertical sum of individual demand curves.
  - c) The vertical average of individual demand curves.
  - d) The horizontal average of individual demand curves.

## Normal-Period Exam — Part B

Maximum duration of the exam: 1 hour and 30 minutes

1. You cannot look up books or notes of any kind. Invigilators will not help you with the test.
2. Switch off and put away any graphical calculators, computers, mobile phones, or any other data storage device.

### QUESTION 1 (2 marks)

Two firms sell to the same market, and they may choose to advertise or not to advertise. This results in the following payoff (profit) matrix:

		<i>Firm B</i>	
		<i>Advertise</i>	<i>Don't advertise</i>
<i>Firm A</i>	<i>Advertise</i>	200, 150	500, 100
	<i>Don't advertise</i>	100, 500	400, 400

- a) (2 marks) Does any firm have a dominant strategy? Find the equilibrium in pure strategies.
- b) (1.5 marks) Without any calculations, is there any other Nash equilibrium (in mixed strategies)? Explain.
- c) (1.5 marks) If this game is indefinitely repeated is it possible that both firms decide never to advertise? Explain.

### QUESTION 2 (3 + 3 marks)

Stormy Island is inhabited by Joe Drizzle and Louise Breeze only. The government is considering broadcasting the country's main radio stations to the island. Joe's willingness to pay for broadcasting hours per day ( $Q$ ) is  $P^J = 10 - Q$ ; Louise's willingness to pay is  $P^L = 8 - 2Q$ . The marginal cost of broadcasting is constant at 9.

- a) (2 marks) Discuss whether radio broadcasting to the island is a public good. Explain whether free riding could arise.
- b) (2 marks) Find the aggregate demand curve for radio broadcasting, and find the socially optimal number of daily hours of broadcasting.
- c) (1 mark) The government decides that each islander should fund the optimal radio broadcast according to their individual willingness to pay. Assuming the optimal provision is  $Q^*$ , how much should Joe and Louise pay for radio broadcast to the island. Is this a realistic way to fund a public good? Explain.

### ANSWERS TO PART A

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
c	b	a	d	a	d	a	c	c	b	b	c	d	a	c	b

### ANSWERS TO PART B

#### Question 1

- a) Both firms have a dominant strategy, which is *Advertise*. So there is an equilibrium in dominant strategies: (*Advertise*, *Advertise*).
- b) No, because no matter what the other firm does, each firm is better off playing *Advertise*; so this remains true even if the other firm decided to play the dominated strategy with some positive probability.
- c) It is. There will be an equilibrium where both firms play tit-for-tat: they do not advertising in first round, and in the following rounds each does what the other has done in the previous round. The outcome is that they never advertise, and get a higher payoff in every round. That is if one advertised in one round (and the other did not), it would make an even bigger profit in that round, but then the other would retaliate, and the first one would make lower profits from then on.

#### Question 2

- a) It is a public good because if the cost of providing the service is the same no matter whether just one inhabitant listens to the broadcast or both do, and if it is provided there is no way from preventing anyone from using it. There would be free riding: if, say, Joe decided to bear the cost of providing some hours of broadcasting, Louise could then listen to the broadcast without contributing (i.e. she would free ride), leading to an inefficiently low level of provision.
- b) The aggregate inverse demand curve is  $P^J + P^L = 18 - 3Q$ . The optimal quantity is that that equates the aggregate willingness to pay to the marginal cost:  $18 - 3Q = 9 \Leftrightarrow Q = 3$ .
- c) Joe would pay  $10 - Q^*$ , and Louise would pay  $8 - 2Q^*$ . For instance, if the government decided to provide the optimal quantity,  $Q^* = 3$ , and Joe would pay 7, and Louise 2. This is unrealistic, because the government does not know individuals' willingness to pay.