Midterm 1

Full name: ………………………………………………………………………………………………………

Student number: …………………………..…………….   Class: ………………………….

1. This exam consists of two parts. Part A consists of 12 multiple-choice questions and is worth 10 points. Part B consists of 2 open questions and is also worth 10 points.
2. Part A must be completed in 50 minutes and Part B in the remaining 40 minutes.
3. Indicate your answers to part A with an "X" in the table below. Each correct answer is worth 10/12 ($\approx$ 0.83) points and each wrong answer is penalized by (10/12) /3 ($\approx$ 0.28) points.
4. Any kind of consultation is not allowed.
5. Turn off mobile phones, computers, tablets, and smartwatches. Their use will be considered fraud. The use of a non-graphical calculator is allowed.
6. Write your full name and student number on every answer sheet.
7. Return this answer sheet even if you withdraw from the exam.

ANSWER TABLE

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

English – Version A

# PART A
MULTIPLE CHOICE (10 points / 50 min)

1. The roundabout at Marques de Pombal is a central point in the road network of Lisbon. There are no tolls to access this roundabout. Traffic congestion is a persistent problem. Thus, we can say that this roundabout is an example of a _____. Users of this good tend to ignore the _____. As a result, this situation can lead to the _____.

      a. common good; positive consumption externality; exclusivity of consumption.
      b. public good; negative production externality; tragedy of the public.
      c. mixed well; positive production externality; productive escalation of motor vehicles.
      d. common good; negative consumption externality; tragedy of the commons.

2. In the market represented by the graph below, there is a negative externality associated with demand D, with S being the supply, and SMB the marginal social benefit. The area representing the deadweight loss (DWL) resulting from this negative externality is given by:

      a. area 1.
      b. area 1 + area 2 + area 3.
      c. area 1 + area 2.
      d. area 2.
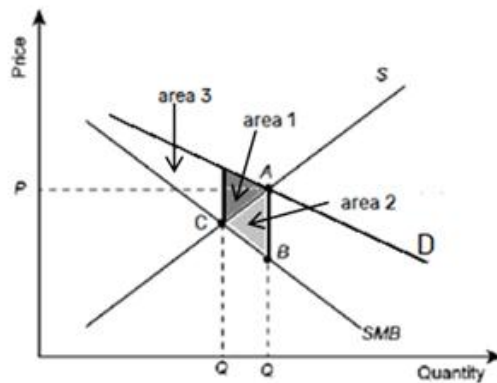
3. Under what conditions can different parts of the private sector negotiate with each other to resolve externalities without government intervention, according to the Coase Theorem?

      a. When property rights are recognized in court.
      b. When externalities are only negative and there are no transaction costs.
      c. When property rights are well defined, whatever the transaction costs.
      d. When property rights are well defined, and transaction costs are low.

4. In case of a negative production externality, an optimal Pigouvian tax should be equal to _____ at the socially efficient level of production. This tax aims to align _____ with _____, thus promoting the optimal amount of production.

    a. marginal social cost; private marginal cost; marginal social benefit.
    b. external marginal cost; private marginal cost; private marginal benefit.
    c. external marginal cost; marginal social cost; private marginal benefit.
    d. marginal social benefit; private marginal cost; marginal social cost.

5. In a cap-and-trade market for CO_2 emissions, the government sets a limit on total CO_2 emissions and assigns tradable permits to companies. Which of the following statements is true regarding the economic efficiency of this market?

    a. Firms with lower abatement costs (i.e., costs to reduce environmental impacts) have an incentive to reduce CO_2 emissions below their allocated allowances and sell excess allowances to firms with higher abatement costs.
    b. The government sets the price of pollution permits to achieve a specific level of CO_2 emissions reduction.
    c. Cap-and-trade markets for CO_2 emissions are less efficient than other price regulations, since they do not provide companies with flexibility in how to reduce emissions.
    d. The cap-and-trade market for CO_2 emissions ensures that all firms reduce emissions by the same amount.

6. Preferences that reflect risk aversion are characterized by a _____ marginal utility of consumption.

    a. variable.
   b. decreasing.
    c. increasing.
    d. constant.

7. Manuela is considering purchasing some insurance for a potential loss of assets worth €10,000. The probability of this loss is 10%. The insurance premium is €1,000. Assuming that Manuela is risk averse, which of the following statements is most likely to be true?

    a. Manuela will not purchase insurance because the expected monetary value without insurance is greater than the expected monetary value with insurance.
    b. Manuela will only purchase insurance if the expected monetary value with insurance is greater than the expected monetary value without insurance.
    c. Manuela will purchase insurance if the expected utility of the monetary value with insurance is less than the expected utility of the monetary value without insurance.
    d. Manuela will purchase insurance if the expected utility of the monetary value with insurance exceeds the expected utility of the monetary value without insurance.

8. The certain equivalent is less than the expected value of a game when the individual's preferences reveal

    a. risk aversion.
    b. dependence on income level.
    c. risk seeking behavior.
    d. risk neutrality.

9. Which of the following scenarios is an example of a separating equilibrium with asymmetric information in a home appliance sales market?

    a. The government imposes a standard warranty requirement on all products.
    b. All sellers offer the same warranty regardless of product quality.
    c. All sellers sell their products at identical prices with identical warranties, regardless of product quality.
    d. High-quality producers offer extended warranties, while low-quality producers offer minimal or no warranties.

10. In markets with adverse selection, regardless of whether there is screening or signalling, the equilibrium will always be less efficient than in a competitive market without asymmetric information because:

    a. low-risk consumers always end up paying the same price as high-risk consumers, cancelling out the effects of screening and signalling.
    b. government intervention becomes necessary to restore efficiency, regardless of market solutions.
    c. asymmetric information always leads to the unravelling of any market, eliminating any possibility of efficiency.
    d. the screening and signalling process involves additional costs and may lead to contracts that are not efficient.

11. In the car insurance market for drivers with different accident risk levels, there is adverse selection that results in inefficiency associated with setting an average premium for all drivers. This inefficiency results because:

    a. all low-risk drivers have welfare gains, and all high-risk drivers have welfare losses.
    b. the total surplus decreases.
    c. there is a tendency for low-risk drivers to purchase excess insurance, increasing costs for insurers.
    d. insurers record negative profits resulting from excessive competition, which reduces premium prices below the actual costs.

12. The graph below shows a car insurance market for drivers with different levels of accident risk (high and low) that generate different levels of marginal cost for insurers (MC^1 and MC^2, respectively). The two driver types have the same demand for car insurance, so that $D^1 = D^2$. The welfare loss that emerges from the asymmetric information problem and the establishment of an average price p^* for all drivers can be identified by the areas:

a. g+j

b. n+m+j

c. g+h+m+j

d. m+g
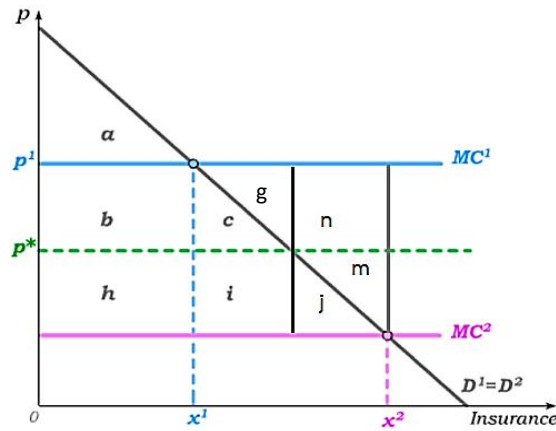
PART B
OPEN QUESTIONS (10 points / 40 min)

Question 1. Consider the country of Mordor. Since they are a combative nation, they contemplate the invasion of its neighboring country Gondor.

Mordor has an original baseline wealth of $W_m = 900$ gold pieces, which they simply retain if they do not invade Gondor. If they decide to invade Gonder, however, with probability $p_M = 0.8$ the invasion is successful and Mordor conquers Gondor, which results in an increase in Mordor's wealth to in total $W_m = 1600$ gold coins. With $1 - p_M = 0.2$, the invasion fails, and Mordor incurs costs that reduce its wealth to in total $W_m = 625$ gold pieces.

The satisfaction (utility) function of the population of Mordor is given by $U_m(W_m) = \sqrt{W_m}$.

a) How do you classify Mordor's risk preferences? Justify your answer. [1p]

b) Show that Mordor will proceed with the invasion of Gondor. Justify [1p].

c) Gondor is concerned about possible invasion and is considering a peace treaty with Mordor. This agreement consists of paying Mordor a certain number of gold coins to ensure that there is no invasion. Assume such an agreement is binding (i.e., in case Mordor accepts these gold coins it cannot invade Gondor).

What is the minimum amount that Gondor must pay to Mordor that guarantees the level of satisfaction of the population of Mordor equal to what it would have in a probabilistic invasion scenario? (Hint: recall that Morder has a baseline wealth of 900 in case they do not invade; draw a graph) [1.5p]

d) Now suppose that Gondor has a population satisfaction (utility) function given by $U_G(W_G) = W_G$ and an original baseline wealth equal to $W_G = 1200$ gold coins (i.e., if Mordor does not invade). If Mordor invades Gondor and Gondor is defeated (with 80% probability), Gondor is left with zero wealth. If Mordor attacks Gondor, but Gondor wins (with 20% probability), then Gondor only incurs some costs of the war and ends up with a wealth level equal to $W_G = 1000$ gold coins.

What is the maximum amount Gondor is willing to pay Mordor to prevent invasion? Will it be possible to reach an agreement considering the result found in question c? [1.5p]

Question 2. Consider that, in the lands of Gondor, there is a competitive market for horses.

Suppose that in the horse market, 60% of the horses are athletic, strong and fast; the remaining 40% are lazy, weak and slow. Potential sellers know the quality of each horse and will sell an athletic horse if the price is at least 4100 bronze coins, and a lazy horse if the price is at least 1000 bronze coins.

Potential buyers assign an athletic horse a value of 6,000 bronze coins and a lazy one a value of 2,000 bronze coins.

There are more potential buyers than horses to sell, so the transaction price is always given by the value the buyer places on the horse.

a) If potential buyers can freely distinguish an athletic horse from a lazy horse, what types of horses are sold? What are the respective prices? Explain your answer. [1p]

b) Now suppose that potential buyers cannot distinguish an athletic horse from a lazy horse, but they know what percentage of athletic horses are in the market. Each potential buyer is risk-neutral and is therefore willing to pay a price equal to the expected value the horse has for him. What types of horses are sold? And what are the respective prices? Explain your answer. [2p]

c) Let α be the proportion of athletic horses (i.e., in this question this proportion is not necessarily equal to 0.6). For what values of α would only the lazy horses be sold? [2p]

Question 1

a) U' = dU/dW >0 and U''=d^{2}U/d^{2}U <0, the function is concave: Morder is risk averse.

b) The expected utility of the invasion is given by $EU = 0.8 * \sqrt{1600} + 0.2 * \sqrt{625} = 0.8 * 40 + 0.2 * 25 = 32 + 5 = 37$

The utility of not invading is given by $U(900) = \sqrt{900} = 30$

Mordor chooses to invade since 37 > 30.

c) $\sqrt{CE} = 37 \rightarrow CE = 37^2 = 1369$

This figure shows what Gondor must pay Mordor. Note that the baseline wealth that Mordor has in the absence of invasion is 900. Thus, Gondor would have to pay at least 1369 – 900 = 469 gold coins. This amount is what Mordor would accept to have an agreement and not a war.
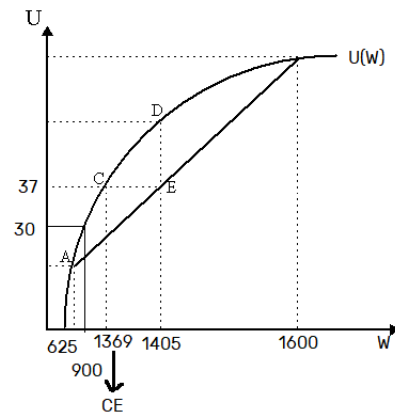
d) Expected utility in case of invasion: $EU = 0.8 * 0 + 0.2 * 1000 = 200$

Utility without invasion: U(1200) = 1200

Comparing these numbers, Gondor is willing to pay 1000 gold coins to avoid invasion (because they have a risk neutral utility function). Comparing it to what Mordor is willing to accept (469 gold coins), it will be possible to reach an agreement.

Question 2

a) Athletic horses are sold for 6000 bronze coins; the lazy horses at 2000 bronze coins.

b) If all horses are put up for sale, the expected value of a horse to the buyer is 0.6 x 6000 + 0.4 x 2000 = 4400 bronze coins. As this exceeds the reserve price of the sellers of athletic horses, all horses will be put for sale, and all horses are thus sold at the price of 4400 bronze coins.

c) Athletic horses will not be offered for sale if the expected value of the horse to the buyer is less than the seller's reserve price for an athletic horse:

$$6000\,\alpha + 2000(1 - \alpha) < 4100 \,.$$

This is the case if $\alpha < 0.525$. In this case only lazy horses are sold at a price of 2000 bronze coins.