



Multiple Choice Test

All 20 multiple choice questions will be graded (4 raw points for the correct answer, -1 raw point for the incorrect answer, 0 points for no answer). Choose one answer in each question.

1. The local grocery store offers a discount of 20% if a customer pays the 10 USD monthly fee. How much should a customer's monthly spending in this store be so that paying this fee makes sense for her?

- 1) At least 10 USD 2) At least 30 USD 3) At least 50 USD 4) At least 60 USD

2. Countries A, B and C produce only watermelons (X) and grapefruits (Y). The production possibility frontiers are given by: $X_A + Y_A = 100$, $2X_B + 3Y_B = 300$, $X_C + 2Y_C = 600$. What is the maximum amount of watermelons that they can produce together if they want to produce at least 200 grapefruits?

- 1) 200 2) 500 3) 600 4) None of the above

3. GDP of the country X grows by 1% per year every year. GDP of the country Y grows by 2% per year every year. If in the year 2019 countries have equal GDP, by what year will their GDP differ by two times? (Choose the nearest estimate).

- 1) 2050 2) 2090 3) 2150 4) 2180

4. Jane spends all her money on the ingredients of her favorite cocktail. To make a portion of the cocktail, she has to mix 200 ml of orange juice with 100 ml of apple juice and with 200 ml of water. Any juice costs 3 USD per liter, water costs 0.5 USD per liter. If she has 20 USD, how many portions of the cocktail can she make?

- 1) 10 2) 12 3) 20 4) None of the above

5. Which of the following statements best describes the concept of *commitment device*?

- 1) A student announces through social media that he will contribute to charity every time he gets a grade lower than B- and publish the receipts online.
2) A country leader announces the new policy of fighting corruption through increased fines for corrupt officials.
3) An investor buys treasury bonds.
4) The price of ice-creams increases after a surge in demand.

6. Which of the following scholars represents the modern institutional theory of economic growth?

- 1) Daron Acemoglu 2) Jared Diamond 3) Thomas Malthus 4) Adam Smith

7. The demand for widgets is given by $Q = 100 - 2P$, the supply is given by $Q = -20 + P$. The government sets the price ceiling at \bar{P} which results in the deficit 30. Find \bar{P} .

- 1) $\bar{P} = 10$ 2) $\bar{P} = 20$ 3) $\bar{P} = 30$ 4) $\bar{P} = 40$

8. Which of the following best describes *natural monopoly*?

- 1) An eco-friendly monopoly.
2) A firm that can produce at lower average costs than two or more firms.
3) A monopoly on the agricultural market.
4) A monopoly that was created without government intervention.

9. Consider a perfectly competitive market where all firms have constant and equal average cost (a *constant cost industry*). How will an increase in demand affect the long run equilibrium price on such a market?

- 1) Price will increase 2) The price will remain constant
3) The price will decrease 4) Unclear

10. You are going to buy a laptop for 1,000 USD. You can either withdraw this money from your bank account (it pays 10% interest yearly) or do it using one of the following credit schemes. Pick the scheme in which you will spend the most amount of money overall.

- 1) Paying directly from your bank account.
2) Credit at 0.1% compound interest per day, the only payment is at the end of the year.
3) Credit at 12% interest rate per year, the only payment is at the end of the year.
4) Credit at 0.5% compound interest per month, the only payment is at the end of the year.

11. A perfectly competitive market has 100 firms, each of which has constant $MC = 10$. The demand function is given by $Q = 100 - P$. How much will the market price increase if all firms create a cartel and maximize joint profit?

- 1) By 15 2) By 35 3) By 45 4) By 50

12. Which of the following happened at the beginning of the 21st century?

- 1) The Great Depression 2) The Great Recession
3) The First Industrial Revolution 4) Collapse of the gold standard

13. Firm S is a monopolist on the market for space tourism. The demand for its service is discrete: consumers are eager to pay 12M USD for the first trip, 11M USD for the second trip, etc., up to 1M USD for the 12th trip. To organize a trip, the firm must spend 4M USD. What is the difference between the maximum profit that the firm S can obtain with the perfect price discrimination compared to linear pricing?

- 1) 10M 2) 16M 3) 20M 4) None of the above

14. You can often hear the success stories of investors who earn a lot of money at the stock market. At the same time, the stories of many failures remain untold. This can create a wrong impression that investing in the stock market is always profitable. This logical fallacy is called...

- 1) Survivorship bias 2) Confirmation bias
3) Self-fulfilling prophecy 4) Endowment effect

15. Which of the following best describes the concept of *liquidity trap*?

- 1) A person cannot withdraw money from his bank account because of the bank's bankruptcy.
2) A firm wants to invest money earned but cannot find projects worth investing in.
3) A government has so much debt that it has to default.
4) The interest rate is so low that people prefer holding cash.

16. Which of the following best describes the concept of *negative trade balance*?

- 1) A country buys from abroad more than it sells abroad.
2) A country buys from abroad less than it sells abroad.
3) A country's GDP decline for more than three quarters.
4) A country's FDI decline for more than three quarters.

17. Which of the following policies will most likely reduce the Gini coefficient?

- 1) Progressive income tax.
2) Regressive income tax.
3) Fixed rate income tax.
4) None of the above.

18. Which of the following statements best describes the concept of *network externality*?

- 1) The service is provided on-line.
2) Producer uses multilevel marketing to attract new customers.
3) The individual utility of using a service increases with the total number of users.
4) The marginal tax rate increases with an increase of income.

19. Which of the following instruments is typically the riskiest one?

- 1) U.S. Treasury bills
- 2) Common stocks of a company from S&P 500
- 3) Deposit in a commercial bank
- 4) Shares of a startup in Silicon Valley

20. Choose the government policy that will by itself reduce short-run GDP (use the AD-AS model).

- | | |
|-----------------------------------|-------------------------------------|
| 1) Increase in the sales tax rate | 2) Decrease in the income tax rate |
| 3) Quantitative easing | 4) Buying assets on the open market |



Open Questions

Solve no more than 4 questions out of 5. Indicate your choice of questions to grade on page 3 of your paper.

If you provide solutions for all 5 questions, all of them will be commented by the Jury, but only 4 will add to your score. In this case, if you do not specify which to grade, the maximum grade of 5 will be excluded.

Every open question is worth 30 raw points.

If not stated otherwise, think of all goods, services and assets as of infinitely divisible. Numbers of firms and people may be only integer.

Convey your ideas clearly. Don't skip important logical transitions in your reasoning. Take care of handwriting. If you strike something out, it won't be graded.

If you want to leave the room for a while, raise your hand and ask a volunteer.

Good luck!

Question 1. “Mechanism Design”

(30 raw points)

There are three kids: Alice, Bob and Clara. Their mother wants to split a cake of size 1 into three pieces and distribute them among the kids. Every kid wants to eat as much cake as possible.

a) (10 rp) Consider the following mechanism. Alice cuts the cake in three pieces the way she likes; then Bob takes any piece he likes, and then Clara takes any piece she likes (of the two that are left), so Alice is left with another remaining piece. How will Alice cut the cake?

b) (20 rp) Now consider a more complicated situation. A kid is *unhappy* if he or she gets less than a certain share of a cake. In particular, Alice will be happy if she gets at least a piece of size a , Bob needs at least b , Clara needs at least c . For every kid, getting a piece of the minimum required size is better than getting no cake, which is, in turn, better than getting a piece of less than the minimum required size. If one is already happy, he or she nevertheless prefer getting more cake to less cake. The mother knows that $0 < a, b, c < 1$ but does not know a , b or c . All three children know all three numbers. Under which a, b, c does a mechanism that ensures each of the kids is happy exist? Suggest such a mechanism.

Question 2. “Automation”

(30 raw points)

The economic growth of the last 150 years has been largely driven by automation – new technologies that allowed mechanization of routine tasks previously performed by labor. The steam engine, electricity, computer chips – all these technologies both contributed significantly to economic growth *and* destroyed jobs.

The most recent wave of automation – the rise of Artificial Intelligence (AI) – seems to be able to automate not only low-skill, physical tasks but also non-routine, cognitive tasks such as driving cars and making medical recommendations. This seems to spur widespread anxiety that artificial intelligence may create mass unemployment in the decades to come. In this task, you are asked to comment on these developments from an economic standpoint.

a) (10 rp) Consider the following simple model. Suppose in a certain industry (say, textiles) the quantity produced (Q) is equal to the degree of automation (A) times the number of workers (L): $Q = AL$. The industry is competitive. The wage is fixed at the level w . The demand for textiles is equal to $D(p)$ where p is price, and D is a decreasing function. Economic equilibrium occurs at a price p such that demand equals supply. Suppose the degree of automation (A) grows so that now the industry needs fewer workers to produce a given amount of textiles. Will the *equilibrium* number of workers employed by the industry necessarily fall as a result? Provide a verbal explanation of the insight you get from the model.

In the following parts, do not limit your argumentation to the model above.

b) (10 rp) A number of authors note that the growth of economic output due to AI and automation will lead to an increase in aggregate incomes, and thus demand, including the demand for new goods and services that are now barely imagined. All this will create new jobs and thus alleviate the problem of unemployment. Criticize this argument.

c) (10 rp) Many people think that publicly financed Universal Basic Income (UBI)¹ is a good solution to the problem of mass joblessness. Identify and address the main problems with the UBI in terms of financing the system and motivation to work (one of each).

¹UBI is a periodic cash payment delivered to all on an individual basis without means test or work requirement.

Question 3. “Fighting drugs”

(30 raw points)

Chicago is one of the largest cities in the United States with an estimated population of 2.7 million. Located on the shores of freshwater Lake Michigan, Chicago is an international hub for finance, culture, commerce, industry, technology, and transportation. The University of Chicago boasts one of the best economics departments in the world, with at least 30 Nobel Prize winners affiliated with the department. Unfortunately, the city of Chicago has had a serious problem with drug (narcotic) consumption and drug trafficking.

In 2012 alone, there were more homicides in Chicago than in any other metropolis in the United States – a total of over 500, most of which linked to gang violence. According to reports in 2013, “most of Chicago’s violent crime comes from gangs trying to maintain control of drug-selling territories”, and is likely related to the activities of the Sinaloa Cartel, one of the most powerful Mexican drug cartels, which by 2006 sought to control illicit drug distribution.

Chicago’s reputation of a drug trafficking city costs it billions of dollars every year in lost consumption, investment, and unnecessary spending. Chicago public policy officials aspire to reduce drug consumption as it produces negative externalities, which harm the society as a whole, not just the drug addicts.

a) (10 rp) Name at least four negative externalities of drug consumption. Be specific and discuss how, and to what extent, they harm society. Can you think of any positive externalities of drug consumption? Elaborate.

b) (10 rp) Officials have the choice of punishing drug dealers (supply side), drug users (demand side), both or neither, with different levels of severity. Why might you want to target the supply side (drug dealers) as against the demand side (drug users)? Why might you want to target the demand side (drug users) as against the supply side (drug dealers)? Give at least three examples of each. Based on your understanding of the drug-related issues, what problems do you foresee with implementing both policies?

c) (10 rp) Design a specific public policy that you think would be best in reducing drug consumption in Chicago. Bear in mind the specific issues of drug-related problems, for example (1) the fact that drugs are addictive; 2) drug production is illegal in most countries; 3) selling drugs is often connected with violence and other types of crime.

Question 4. “Inequality of Opportunity”

(30 raw points)

Economists often talk about two types of inequality – *inequality of outcomes* (such as income inequality) and *inequality of opportunity*.

a) (15 rp) Give an example of inequality of opportunity. Explain why inequality of opportunity, as opposed to inequality of outcomes, is considered detrimental for economic efficiency and social welfare.

b) (15 rp) There are several well-established measures of income inequality, such as the Gini index. How would you go about measuring inequality of opportunity in a country?

Question 5. “Connecting Short Run and Long Run”

(30 raw points)

Fighting economic crises and recessions has become one of the well-recognized functions of government. But are the fluctuations around the trend really important? In most recessions, the fall in GDP is not more than 3-4 % and the return to the trend is relatively quick. Moreover, one may argue that what is lost in a recession, may be recovered during a boom. In contrast, a one-percentage-point increase in the rate of economic growth can accumulate into a several-fold rise in GDP over the years. So shouldn't we abandon fighting recessions and concentrate fully on long-term growth instead? This task asks you to explore some connections between short run and long run and discuss if recessions are necessarily worth fighting.

a) *(10 rp)* Argue why recessions may have a long-term negative effect on labor market and therefore may slow down long-term growth.

b) *(10 rp)* Suppose that banks require a minimum level of collateral for loans, and it limits a lot of entrepreneurs from getting loans. Argue why recessions may have a negative effect on the rate of long-term innovation, while booms don't have the opposing positive effect.

c) *(10 rp)* Alternatively, suppose that banks do not know the quality of the investment projects of entrepreneurs and offer all applicants the same loan rate, such that it allows banks to at least break even. Argue why recessions might be stimulating long-run economic growth.