Fall 2023 Professor Emmanuel Saez
University of California, Berkeley

ECONOMICS 2

SECOND MIDTERM SOLUTIONS

INSTRUCTIONS

1. Put your name, your SID number, and your GSI's name or your section number in the blanks provided on the front of the exam. ***Please do not put your name or your GSI's name anywhere else on the exam.***

2. The exam is written on ***both sides of the page***. Be sure to answer all the questions.

3. Write all of your answers directly on the exam in the spaces provided. **Use a dark enough pen so that answers remain legible** after electronic scanning.

4. Use blank pages at the back for scratch paper NOT your own paper.

5. The exam consists of three parts. There are 20 points in total. Part I counts for 8 points; Part II counts for 8 points; and Part III counts for 4 points.

6. Turn off and put away all cellphones and other electronics.

7. We collect the exams at exactly 6:30 p.m.

PLEASE DO NOT OPEN THE EXAM UNTIL INSTRUCTED TO DO SO.

Name _____

SID Number _____

GSI or Section Number _____

During the exam, I will NOT obtain help from anyone, provide help to anyone else, or use any notes or other resources. Sign below:

_____

PAGE FOR GRADING ONLY (STUDENTS SHOULD SKIP IT)

QUESTION 1: _____

QUESTION 2: _____

QUESTION 3: _____

QUESTION 4: _____

PROBLEM 5a: _____

PROBLEM 5b: _____

PROBLEM 6a: _____

PROBLEM 6b: _____

MULTIPLE CHOICE: _____

TOTAL: _____

PART I: SHORT ANSWER [8 POINTS TOTAL]

Answer all questions. Be sure to explain your answers and to draw diagrams where they are appropriate.

1. Suppose you were given a choice between receiving \$FA dollars 3 years from now or \$FB dollars 1 year from now, and suppose the nominal interest rate is i. What calculations would you need to make to compare the present value of the two options? **[2 points]**

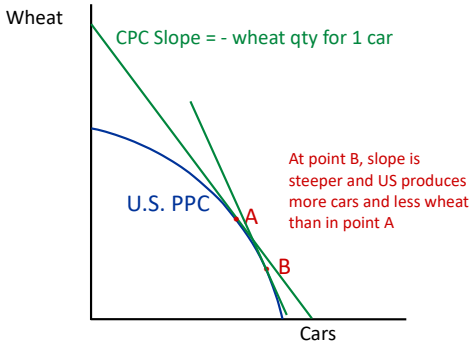
The present value of a single payment to be received in the future is $\$F/(1 + i)^t$,

Where \$F is the amount of the payment, i is the nominal interest rate (expressed as a decimal), and t = number of years in the future the payment is to be received.

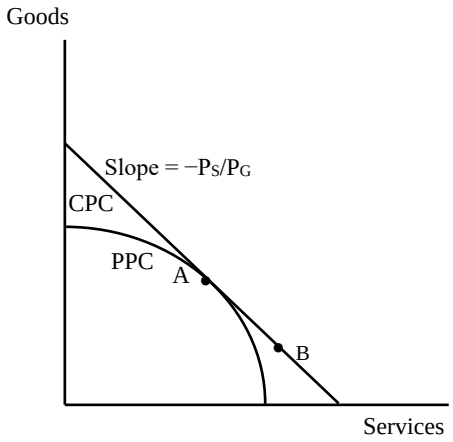
Thus, you need to calculate $\$F_A/(1 + i)^3$ and $\$F_B/(1 + i)$ and then choose the larger one.

2. Suppose a country can produce two goods: wheat and cars. If the terms of trade change so that 1 car trades in world markets for more wheat than before, how will this change the combination of the two goods the country wants to produce? **[2 points]**

It will increase car production and reduce wheat production in the country to take advantage of the higher price of car relative to wheat as shows in the diagram below.

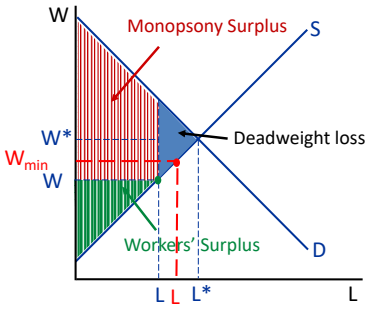


3. Suppose a country produces two broad categories of output: goods and services. Draw the PPC/CPC diagram for the country (with services on the vertical axis and goods on the horizontal axis). If the country is a net importer of services, where on its CPC is it choosing to consume (relative to the bundle that it chooses to produce domestically)? **[2 points]**



4. Suppose a minimum wage is introduced on the labor market and that we empirically observe that it leads to both an increase in wages and employment. Can you draw a model diagram consistent with this? Is this supported by empirical evidence? **[2 points]**

Monopsony: Introducing a minimum wage above W is desirable both for equity and efficiency



Minimum wage above W increases workers surplus (equitable) and also increases L (efficient)

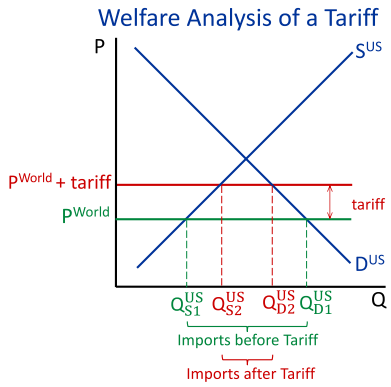
The famous paper by Card and Krueger (1994) on the impact of the minimum wage increase in NJ vs. PA on employment in fast food restaurants supports such a finding. Later work suggests that the impact of min wage on employment is zero.

PART II: PROBLEMS [8 POINTS TOTAL]

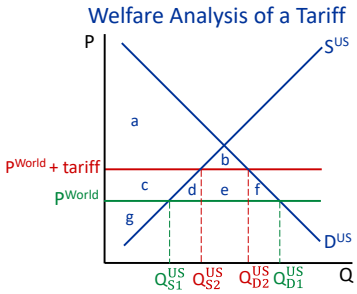
Answer all parts of each question. Be sure to explain your answers and to draw diagrams where they are appropriate. Problems 5 and 6 are independent.

5. Consider the market for solar panels, which the United States both imports and produces domestically. You can assume that the market for solar panels is perfectly competitive and that there is a perfectly elastic world supply of solar panels.

a. Show how a per-unit tariff on imported solar panel could be used to reduce our imports of solar panels. **[2 points]**



b. Would the tariff affect the consumer surplus of American consumers? Would it cause a deadweight loss? **[2 points]** The tariff would reduce consumer surplus because the price paid by American consumers would increase. It would also create deadweight burden as shown in the diagram below.



	Before Tariff(Q^{US}_{S1}, Q^{US}_{D1})	After Tariff(Q^{US}_{D2}, Q^{US}_{S2})
Consumer Surplus	a+b+c+d+e+f	a+b
Producer Surplus	g	c+g
Tariff Revenue		e
Total Surplus	a+b+c+d+e+f+g	a+b+c+e+g
Deadweight Loss		d+f

6. Consider an economy with 1 landowner and 99 landless agricultural workers. Suppose total production is allocated as follows: half goes to the landowners and the other half is divided equally between the 99 landless workers.

a. What is the bottom 99% income share in this economy? Using this information, plot the Lorenz curve that shows the fraction of income earned by the bottom X% of people where X goes from 0% to 100%. What is the Gini coefficient in this economy? [can be guessed from the plot no computations needed] **[2 points]**

Bottom 99% share is the income share of all the landless workers which is 50% with the top 1% share being 50%. Lorenz curve is a straight line with slope ½ and the Gini is 50%.

b. Suppose a minimum wage is introduced in this agricultural economy. While the daily wage in question a. was $10, the minimum wage now requires the landlord to pay his workers $15. Assuming production does not change, recompute the bottom 99% share, replot the Lorenz curve, and recompute the Gini coefficient with this minimum wage. **[2 points]**

Bottom 99% share is the income of all workers which is 75% with the top 1% share being 25%. Lorenz curve is a straightline with slope 3/4 and the Gini is 25%.

PART III: MULTIPLE CHOICE QUESTIONS **[4 POINTS TOTAL]**

Each question is worth .5 points. Please write the letter of the ***best*** answer for each multiple choice questions below, like so:

7. F

8. E

…

7. D

8. C

9. D

10. C

11. C

12. D

13. A

14. D

7. The following developments will tend to increase income inequality:
- **a.** technological change that makes high-skilled workers more productive.
- **b.** increased education for high-skilled workers but not for low-skilled workers.
- **c.** a rise in the world relative price of goods and services produced by low-skilled workers.
- **d.** (a) and (b).
- **e.** (a) and (c).
- **f.** all of the above.
- **g.** none of the above.

8. In our aggregate production function framework, $Y^*/POP = f(K^*/N^*,T)\cdot(N^*/POP)$, N^*/POP is:
- **a.** average education per worker.
- **b.** a measure of the quality of institutions.
- **c.** normal employment as a fraction of the population.
- **d.** the unemployment rate.

9. If no prices change between year t and year t+1, but the quantities of goods and services that are produced increase:
- **a.** nominal GDP does not change between year t and year t+1, but real GDP increases.
- **b.** real GDP does not change between year t and year t+1, but nominal GDP increases.
- **c.** neither nominal GDP nor real GDP increases between year t and year t+1.
- **d.** both nominal GDP and real GDP increase between year t and year t+1.

10. Suppose a typical worker in Vietnam can produce 20 shirts or 10 books in a day, and a typical worker in France can produce 40 shirts or 40 books in a day. If the terms of trade are 1.5 shirts per 1 book:
- **a.** Both Vietnam and France will want to trade shirts for books.
- **b.** Both Vietnam and France will want to trade books for shirts.
- **c.** Vietnam will want to trade shirts for books, and France will want to trade books for shirts.
- **d.** Vietnam will want to trade books for shirts, and France will want to trade shirts for books.
- **e.** Vietnam will want to trade either shirts for books or books for shirts, but France will not want to trade either shirts for books or books for shirts.

11. In 2011, tuition and fees at Berkeley for California residents were roughly \$7000; in 2023, they were roughly \$15,000. Over that period, the CPI rose from 225 to 300. The 2011 tuition and fees in 2023 dollars are:
- **a.** $\$7000 \cdot \frac{\$15{,}000}{\$7{,}000}$.
- **b.** $\$15{,}000 \cdot \frac{\$7{,}000}{\$15{,}000}$.
- **c.** $\$7000 \cdot \frac{300}{225}$.
- **d.** $\$15{,}000 \cdot \frac{225}{300}$.

12. A rise in the real interest rate causes the quantity of investment demanded by firms to:
- **a.** increase, because a higher real interest rate lowers the purchase price of capital.
- **b.** increase, because the rate of return is higher.
- **c.** decrease, because a higher real interest rate makes capital less productive.
- **d.** decrease, because the present value of future marginal revenue products of capital are lower.

13. In an economy with no forces, such as unions or minimum wage laws, that prevent wages from falling, the normal unemployment rate will be:

a. positive, because of "frictional" or "churn" unemployment.
b. positive, because some members of the population, such as many young children and retirees, do not want to work.
c. positive if the economy is in a recession, but zero otherwise.
d. zero.
e. (a) and (b).

14. Suppose that this year 2023, you mine one bitcoin using $20,000 worth of electricity and computer power and sell the bitcoin for $25,000, the current market price. How is this counted in GDP in 2023:

a. $0 because bitcoins do not have intrinsic value.
b. $5,000 because that's the value added to the raw electricity and computer materials used in the production of the bitcoin.
c. $20,000 because electricity and computer power are the only real resources used in production.
d. $25,000 because that's the value of the final good produced.
e. None of the above.