

PROBLEM SET 2 WITH ANSWERS

Q.1

Country X is a country with simple economy that produces only six goods: oranges, tshirts, papers, books, bicycles and orange juice. Assume that half of the oranges are used to produce orange juice and one-third of all paper is used to produce books.

YEARS	2022		2023		2024	
PRODUCT	QUANTITY	PRICE	QUANTITY	PRICE	QUANTITY	PRICE
Oranges	180	0.90	200	1.00	200	1.25
T-shirts	70	10.00	80	12.50	100	15.00
Papers	675	0.60	600	0.50	630	0.50
Books	175	3.50	150	3.50	150	3.25
Bicycles	20	85.00	25	90.00	30	95.00
Orange Juice	40	3.50	50	4.00	60	4.50

a. Use the production and price information in the table to calculate nominal GDP for year 2024.

b. Use the production and price information in the table to calculate real GDP for 2022, 2023, and 2024 using 2022 as a base year. What is the growth rate of real GDP from 2022 to 2023 and from 2023 to 2024?

c. Use the production and price information in the table to calculate GDP deflator for 2022, 2023 and 2024 using 2022 as a base year.

a. Nominal GDP for year 2024 = $(200 \times 1.25 \times 1/2) + (100 \times 15) + (630 \times 0.5 \times 2/3) + (150 \times 3.25) + (30 \times 95) + (60 \times 4.5) = 125 + 1500 + 210 + 487.5 + 2850 + 270 = 5442.5$

Nominal GDP = $\sum (\text{Current price} \times \text{Current quantity})$

b. Real GDP for year 2022 = $(180 \times 0.9 \times 1/2) + (70 \times 10) + (675 \times 0.6 \times 2/3) + (175 \times 3.5) + (20 \times 85) + (40 \times 3.5) = 3503.5$

Real GDP for year 2023 = $(200 \times 0.9 \times 1/2) + (80 \times 10) + (600 \times 0.6 \times 2/3) + (150 \times 3.5) + (25 \times 85) + (50 \times 3.5) = 3955$

Real GDP for year 2024 = $(200 \times 0.9 \times 1/2) + (100 \times 10) + (630 \times 0.6 \times 2/3) + (150 \times 3.5) + (30 \times 85) + (60 \times 3.5) = 4627$

Real GDP = $\sum (\text{Base year price} \times \text{Current quantity})$

Growth rate of real GDP from 2022 to 2023 is %12.89 and from 2023 to 2024 is %16.99 c.

Nominal GDP for year 2022 = 3503.5

Nominal GDP for year 2023 = $(200 \cdot 1 \cdot 1/2) + (80 \cdot 12.5) + (600 \cdot 0.5 \cdot 2/3) + (150 \cdot 3.5) + (25 \cdot 90) + (50 \cdot 4) = 4800$

$\text{GDP Deflator}_t = (\text{Nominal GDP}_t / \text{Real GDP}_t) \cdot 100$

GDP Deflator for year 2022 = $(3503.5 / 3503.5) \cdot 100 = 100$

GDP Deflator for year 2023 = $(4800 / 3955) \cdot 100 = 121$

GDP Deflator for year 2024 = $(5442.5 / 4627) \cdot 100 = 117$

Q.2

Suppose the following data apply for Berryland for the year 2024

Income of nonfarm business	27
Indirect taxes less subsidies	60
Change in inventories	10
Government current expenditures on goods and services	130
Income of farmers from farm production	25
Personal consumption expenditures	345
Export of goods and services	133
Interest and miscellaneous investment income	69
Gross fixed capital investment	101
Personal income tax	75
Income generated by XY Factory in Berryland	140
Social Security contributions	50
Total corporation profits before taxes	70
Undistributed corporation profits after taxes	4
Imports of goods and services	170
Government transfer and indirect payments to individuals	80
Wages, salaries and supplementary labor income	263
Capital consumption allowances (Depreciation)	35
Corporate taxes	40
Income generated by ABC Factory in Cherryland	400

Using the information given above, compute the following macroeconomic figures. Assume that the items that are not given above are equal to zero. (Show all your work and formulas)

Note: XY Factory is a foreign firm; ABC Factory is a domestic firm.

- i) Gross Domestic Product by using the expenditure approach (at market prices)

$$GDP = C + I + G + X - M$$

For this question, GDP is as follows:

GDP=personal consumption expenditure+ gross fixed capital investment+ change in inventories + government current expenditure on goods and services+ export of goods and services-imports of goods and services

$$GDP = 345 + 101 + 10 + 130 + 133 - 170 = 549$$

- ii) Gross National Product by using the expenditure approach (at market prices)

GNP=GDP+ Net Factor Incomes from abroad

NFI=Income generated by ABC Factory in Cherryland - Income generated by XY Factory BP in Berryland

$$GNP = 549 + (400 - 140) = 809$$

- iii) Gross National Product by using the income approach (at market prices)

GNP = Wages, salaries and supplementary labour income + Total corporation profits before taxes + Interest and miscellaneous investment income + Income of nonfarm unincorporated business + Income of farmers from farm production + Indirect taxes less subsidies + Capital consumption allowances (depreciation) + Income generated by ABC Factory in Cherryland - Income generated by XY Factory BP in Berryland

$$GNP = 263 + 70 + 69 + 27 + 25 + 60 + 35 + 400 - 140 = 809$$

- iv) National Income

It is equal to the Net National Product

There are two different ways to calculate NNP: at market prices and at factor prices.

NNP at factor prices= GNP at market prices-capital consumption allowances (depreciation)- indirect taxes less subsidies

$$NNP \text{ at factor prices} = 809 - 35 - 60 = 714$$

NNP at market price= GNP at market prices-capital consumption allowances (depreciation)

$$NNP \text{ at market prices} = 809 - 35 = 774$$

- v) Personal Income

Personal income = national income (factor prices)-corporate taxes-social security contributions-undistributed corporation profits after taxes+ government transfer and indirect payments to individuals

$Personal\ Income = 714 - 40 - 50 - 4 + 80 = 700$ Personal
income = national income (market prices)-corporate taxes-social security
contributions-undistributed corporation profits after taxes+ government
transfer and indirect payments to individuals - indirect taxes less subsidies
 $Personal\ Income = 774 - 40 - 50 - 4 + 80 - 60 = 700$

vi) Disposable Income

Disposable income = personal income – personal income tax

$Disposable\ Income = 700 - 75 = 625$

Q.3

Which of the following are included and which are excluded in calculating this year's GDP?
Explain in each instance.

- a. Social security checks received by a retired person
 - b. The income received from interest on a corporate bond
 - c. The person who purchases a cosmetic product
 - d. The purchase of a used tractor by a farmer
 - e. An increase in business inventories
 - f. Government purchase from a private business
- a. A social security payment is not included because it is a transfer payment, not payment for productive services.
 - b. The income from a corporate bond is included because it is payment for use of capital resources during that year.
 - c. This consumer purchase would be part of consumption and would be included.
 - d. The used tractor is not included because it was counted when it was new.
 - e. An increase in business inventories is included as a part of business investment.
 - f. Government purchase from a private business is included as a part of government spending on goods and services.

Q.4

How does the GDP deflator differ from the CPI?

1. The GDP deflator measures a changing basket of commodities while CPI always indicates the price of a fixed representative basket.
2. GDP deflator frequently changes weights while CPI is revised very infrequently.
3. CPI will consider imported goods because they are still considered as consumer

goods while GDP deflator will only contain prices of domestic goods.

Q.5

In 1924, the famous novelist F. Scott Fitzgerald wrote an article for the Saturday Evening Post titled “How to Live on \$36,000 a Year,” in which he wondered how he and his wife had managed to spend all of that very high income without saving any of it. The CPI in 1924 was 17, and the CPI in 2010 was 218. What income would you have needed in 2010 to have had the same purchasing power that Fitzgerald’s \$36,000 had in 1924? Be sure to show your calculation.

5.3 We can convert Fitzgerald’s 1924 nominal income of \$36,000 to an equivalent income in 2010 by multiplying the 1924 nominal income by the ratio of the CPI for 2010 to the CPI for 1924: $\$36,000 \times (218/17) = \$461,647$. So, you would have needed an income of \$461,647 in 2010 to have the same purchasing power that Fitzgerald’s \$36,000 had in 1924.

Q.6

The following values describe the yearly Consumer Price Index (CPI) in a hypothetical economy.

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024
CPI	45	65	80	100	116	132	149	166	173

- a. What is the rate of inflation in 2016?

Since we don’t have the CPI value of 2015, we can’t compute it.

As the CPI of 2016 is lower than other years, we know that in 2016 the cost of living was lower than in later years. But we don’t know how much the average prices increased from 2015 to 2016.

- b. What are the rates of annual inflation for the years 2017 and 2024?

Inflation in 2017 = $[(\text{CPI } 2017 - \text{CPI } 2016) / \text{CPI } 2016] \times 100 = [(65 - 45) / 45] \times 100 = 44.4\%$

Inflation in 2024 = $[(\text{CPI } 2024 - \text{CPI } 2023) / \text{CPI } 2023] \times 100 = [(173 - 166) / 166] \times 100 = 4.22\%$

- c. What is the inflation rate between 2017 and 2024?

$$[(\text{CPI}_{2024} - \text{CPI}_{2017}) / \text{CPI}_{2017}] * 100 = [(173 - 65) / 65] * 100 = 166.15\%$$

- d. Can you determine which year is the base year?

Since the CPI is equal to 100 for 2019, we can say that 2019 is the base year.

- e. Change the base year of the index to 2021=100 and compute the index values for years 2017 and 2024 accordingly. Is the inflation rate affected when you change the base year?

To make CPI of 2021=100, $132/132 * 100 = 100$

We have adjusted CPI_{2021} as 100 so we need to apply same procedure for all years to make them still comparable

For 2017: $65/132 * 100 = 49.24$

For 2016: $45/132 * 100 = 34.09$

Inflation in 2017 (2021=100) = $[(49.24 - 34.09) / 34.09] * 100 = 44.44\%$

Inflation in 2024 (2021=100) = $[(131.06 - 125.75) / 125.75] * 100 = 4.22\%$

Changing the base year has no effect on inflation rate. However in some cases changing the base year may change the inflation rate.

Q.7

Suppose Turkey experiences a long period of inflation relative to other countries. How would this affect Turkey's net exports?

If inflation in Turkey is higher than inflation in other countries, then prices of products and services produced in Turkey increase more rapidly than the prices of products and services of other countries.

This difference in the price levels decreases the demand for Turkish goods relative to foreign goods. Turkey's exports decrease, imports increase, and Turkey's net exports decline (when exchange rate would be unchanged).

TRUE OR FALSE QUESTIONS (Please explain your answers)

- a. The \$17,000 spent by a textile firm in replenishing its inventories is not counted in GDP since it is neither consumption, nor investment, nor government expenditures.

False. Inventories is one of the components of investment.

- b. German automobiles, sold in 2006 produced in 2005 included in Germany's GDP in 2006.

False. Old (2005's) output is not counted in current (2006's) GDP. The automobiles are counted in the GDP of the year in which they are produced (2005).

- c. Final sales of \$8,000 worth of CDs without copyright are counted in the GDP calculations because its production involved the factors of production.

TRUE. The sales of CDs should be part of the GDP. But this transaction – especially if conducted in cash – will not be reported to the government and therefore, in reality it will not be included in the GDP.

- d. The income of foreigners working in Turkey is counted in the Turkish GNP as long as those foreigners work for a Turkish company.

False. Turkish GNP will only count the income of Turkish citizens irrespective of where this income is generated

- e. If a cobbler buys leather for €120 and thread for €45 and uses them to produce and sell €500 worth of shoes to consumers, the contribution to GDP is €665.

False. We consider final goods so the contribution to GDP is €500.

MULTIPLE CHOICE QUESTION

Q1) Which of the following goods is directly counted in GDP?

- A) the lettuce that Subway purchases for its sandwiches
- B) the bread that Subway purchases for its sandwiches
- C) a 12-inch Subway sandwich purchased by a student
- D) the plastic bags that Subway purchases to wrap its sandwiches,

Q2) Value added equals the market price of the firm's product minus

- A) wages and salaries.
- B) the price of intermediate goods.
- C) the price of all factors of production.
- D) depreciation on plant and equipment.

Q3)

Product	Quantity	Price
Sweatshirts	50	\$35.00
Dental examinations	40	75.00
Coffee drinks	1,000	4.00
Coffee beans	2,000	0.50

Refer to the table above. Suppose that a simple economy produces only four goods and services: sweatshirts, dental examinations, coffee drinks, and coffee beans. Assume all of the coffee beans are used in the production of the coffee drinks. Using the information in the above table, nominal GDP for this simple economy equals,

- A) 3,090 units.
- B) \$7,250.
- C) \$8,750.
- D) \$9,750.

Q4) Refer to the table below. Suppose that a simple economy produces only four goods and services: shoes, DVDs, tomatoes, and ketchup. Assume one half of the tomatoes are used in making the ketchup and the other half of the tomatoes are purchased by households. Using the information in the above table, nominal GDP for this simple economy equals

Product	Quantity	Price
Shoes	40	\$60.00
DVDs	100	18.00
Tomatoes	2,000	1.00
Ketchup	300	4.00

- A) \$7,400.
- B) **\$6,400.**
- C) \$5,800.
- D) 2,440 units.

Q5) Gross domestic product understates the total production of final goods and services because of the omission of

- A) exports.
- B) inflation.
- C) intermediate goods.
- D) **household production.**

Q6) The underground economy can be described as

- A) production of intermediate goods and services.
- B) economic production that includes mining.
- C) **economic activity that is hidden from the government to avoid taxes or because the activity is illegal.**
- D) production of infrastructure that spurs growth in the rest of the economy.

Q7) The labor force equals the number of people A)

employed.

B) unemployed.

C) **employed plus unemployed.**

D) in the working-age population.

Please answer the next two questions referring to the table below.

Total population	20,000
Working-age population	15,000
Employment	1,000
Unemployment	100

Q8) The unemployment rate for this simple economy equals

A) $(100/1,000) \times 100$.

B) **$(100/1,100) \times 100$.**

C) $(100/15,000) \times 100$.

D) $(100/20,000) \times 100$.

Q9) The labor force participation rate for this simple economy equals A)

$(1,000/1,100) \times 100$.

B) $(1,000/15,000) \times 100$.

C) **$(1,100/15,000) \times 100$.**

D) $(1,100/20,000) \times 100$.

Q10) Suppose the labor force and the working-age population stay constant. However, those who were once unemployed became employed. The labor force participation rate will

- A) increase.
- B) decrease.
- C) remain constant.
- D) not change in a way that can be predicted.

Q11) Which of the following cause measured unemployment rate to understate the true extent of joblessness?

- A) inflation
- B) discouraged workers
- C) people employed in the underground economy
- D) unemployed persons falsely report themselves to be actively looking for a job

Q12) Euphoria lost her job six months ago, and she's been actively looking for a new job ever since. Euphoria is

- A) unemployed.
- B) out of the labor force.
- C) a discouraged worker.
- D) all the above.

Please answer the next two questions referring to the table below.

Year	Real GDP (billions of 2000 dollars)
2010	\$8,700
2011	8,875
2012	9,000
2013	9,280

Q13) Using the table above, what is the approximate growth rate of real GDP from 2012 to 2013?

- A) 1%
- B) 2%
- C) 3%
- D) 4%

Q14) Using the table above, what is the approximate average annual growth rate from 2010 to 2013?

- A) 1%
- B) 1.5%
- C) 2%
- D) 3

Q15) In a closed economy, which of the following components of GDP is not included?

- A) investment
- B) government spending
- C) net exports
- D) consumption

Q16) If firms are more optimistic that future profits will rise and remain strong for the next few years, then

- A) investment spending will fall.
- B) **investment spending will rise.**
- C) investment spending will remain unaffected.
- D) investment spending will rise and then fall.

Q17) The average price of goods and services in the economy is also known as

- A) **the price level.**
- B) the inflation rate.
- C) a market basket.
- D) the cost of living.

Q18) If the price level rose in three consecutive years from 100 to 120 to 140, then the annual inflation rate over those years would A) increase.

- B) remain the same.
- C) **decrease.**
- D) equal 20%.

Q19) If your nominal wage rises faster than the price level, we can say your real wage has _____ and the purchasing power of your income has _____.

- A) fallen; fallen
- B) fallen; risen
- C) **risen; risen**
- D) risen; fallen

Q20) You lend \$5,000 to a friend for one year at a nominal interest rate of 10%. Inflation during that year is 5%. As a result, you will receive _____ at the end of the year, but that money has a purchasing power of _____.

A) \$5,050; \$5,025

B) \$5,100; \$5,050

C) **\$5,500; \$5,250**

D) \$6,000; \$5,500

Q21) If the nominal interest rate is 6% and the inflation rate is 2% then the real interest rate is

A) 8%.

B) **4%.**

C) 3%.

D) 2%.

Q22) The broadest measure of the price level that includes all final goods and services is

A) the producer price index.

B) the consumer price index.

C) **the GDP deflator.**

D) the wholesale price index.