Macro Problem Set 1

Q1 (For tutorial discussion, submission is not required)

Read the excerpt from Tim Harford's *The Undercover Economist Strikes Back*, Chapter 11.

a. Harford mentions the "value of people living in their own homes". Explain the issue arising in GDP computation concerning this value, and how the issue is resolved.

b. Harford mentions "household production" and that economist Simon Kuznets, one of the pioneers in conceptualizing GDP, preferred including it in GDP. Do you agree with Kuznets? Provide at least one reason why it should be included in GDP, and at least one reason why it should not.

c. Harford mentions changes in the value of (physical) assets such as buildings. What are the issues he identifies that are pertinent to GDP computation?

Q2

Explain how the values in each of the following transactions are accounted for in Singapore's GDP this year under the expenditure approach.

a. As part of an 'adjustment package' for a future increase in taxes, the Singapore government decides to give $200 in cash each to 1 million families.

b. Marcus buys 10,000 shares of DBS Bank's stock at $10 per share, paying his stockbroker a 1% commission.

is commission part of GDP (Expenditure?)

c. Students purchase 2,000 economics textbooks from the NUS Co-op at $50 apiece. 500 of the textbooks are drawn from the Co-op's stock left-over from last year. The remaining books are freshly printed by its local supplier this year.

how is change in inventory reflected in GDP?

d. Omnidesk, a local maker of motorized standing desks, spends $20 million to purchase motors from an overseas supplier, and spends $10 million to build its own specialized tools to test the desks.

Q3

In computing real GDP and its growth rate, statistical agencies are increasingly moving away from the **fixed-base approach** to an alternative approach known as **chain-linking approach**. The Singapore government's Department of Statistics adopted chain-linking for GDP starting in 2019. This question is designed to help students learn about chain-linking for real GDP and why statistical agencies are adopting it.

Watch this video on chain-linking prepared by Singapore's Department of Statistics.

Singapore Department of Statistics (2019 May 20). ***Introduction to Chain-linking of Real Gross Domestic Product*****. URL: https://www.youtube.com/watch?v=hgbkKn883-U**

Table 1 shows the production data for an economy that produces only two final goods, food and clothing.

Table 1

	Food		Clothing	
Year	**Quantity**	**Price ($)**	**Quantity**	**Price ($)**
2015	5,000	100	7,500	80
2016	6,000	110	8,000	150
2017	7,000	120	9,000	180

a. Find the nominal GDP for each year.
b. Using the fixed-base approach with 2015 as the base year, find the real GDP for all three years. Find the corresponding 2016 and 2017 GDP growth rates.
c. Repeat part (b) with 2016 as the base year instead. Compare these growth rates with the ones you found in part (b). What does this say about the dependence of growth rate computations on the choice of base year in the fixed-base approach?
d. Now use the chain-linking approach as described in the video, with 2015 as the reference year, to compute 2016 and 2017 GDP growth rates. Do these growth rates change if the reference year is changed to 2016? Also compute the real GDP for all three years.

Q4

Consider Table 2 below, which shows the quantities that a typical household in Bigtown City consume in the years concerned, and the prices at which the items were bought. Suppose the CPI basket is 6 shirts and 6 pencils.

Table 2

	2017		2018	
	Price ($)	**Quantity consumed**	**Price ($)**	**Quantity consumed**
Shirts	20	8	20	11
Pencils	15	8	25	5

a. Using 2017 as the base year, compute Bigtown City's CPI for both years. Using your results, find the CPI inflation rate for 2018.
b. Using 2018 as the base year instead, repeat (a). Do you obtain the same inflation rate?
c. Show that the 2018 CPI inflation rate over-estimates the percentage rise in the actual cost of living. Explain the rationale for this over-estimation.

Q5 (For tutorial discussion, submission is not required)

Consider Table 3 below. Suppose the CPI basket is 300 meals and 8 suits, and the base year is 2020.

Table 3

	2020 Price ($)	**2021 Price ($)**
Meals	20	30
Suits	1,000	1,200

a. Compute the 2021 inflation rate for meals only, and for suits only.
b. Compute the 2021 overall CPI inflation rate.
c. Compute the cost of meals as a proportion of the CPI basket in the base year. Do the same for suits.
d. What is the relationship between the overall 2021 CPI inflation rate, the individual goods' 2021 inflation rates, and the proportionate cost of each good in the CPI basket in the base year?

Q6

Ray agrees to lend Chaeyeon $100,000 in January 2018, when the CPI was 100. The agreement specifies that Chaeyeon is to repay Ray $107,000 exactly one year later. Both expected that the CPI to be 103 by then. Note: in the language of finance the initial $100,000 lent is called the **principal sum**, or **principal** in short, and the +$7,000 difference between repayment and the principal is called **interest**.

a. Find the nominal interest rate on the loan.
b. What was the expected inflation rate in 2018?
c. Use your result in (b) and the **Fisher Equation** to approximate the **expected** real interest rate (in January 2018 dollars) that the two have implicitly agreed on.
d. (Hard) Compute the expected real interest (in January 2018 dollars) exactly. Compare this with your approximate solution in part (b). How close is the approximate solution to the exact solution?
e. Suppose the actual CPI in January 2019 turns out to be 105. Use the Fisher Equation to approximate the **actual** real interest rate.
f. How was purchasing power redistributed as the result of inflation being higher than expected?
g. How could the two parties have modified the loan contract to prevent unexpected inflation from redistributing purchasing power? (Key word: **indexation**)