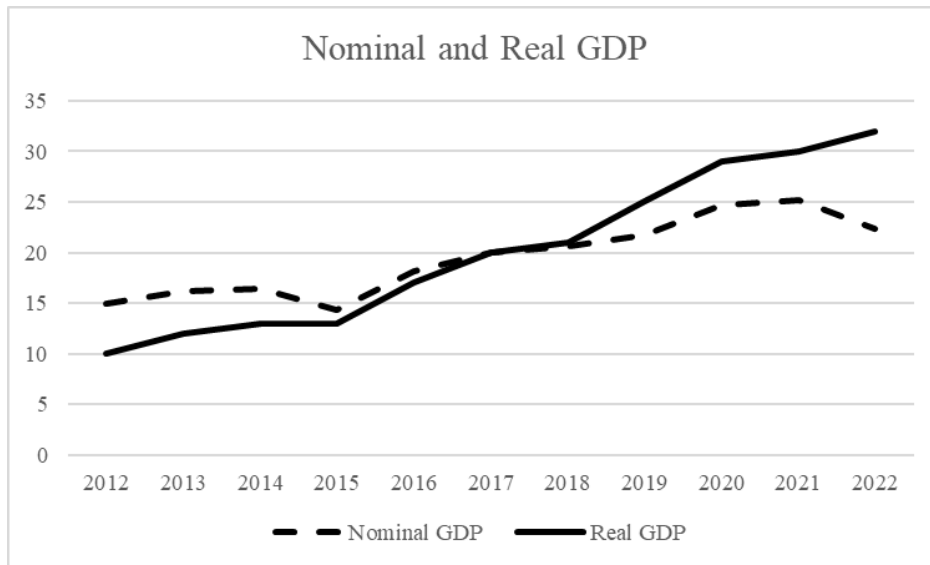


**Show your work. Make sure to provide explanations to your answers for full credit.*

1. Suppose you are an economist working at the International Monetary Fund, and that the production function for countries is given by $y = \bar{A}k^{1/2}$. Where y is equal to output per person, k is equal to capital per person, and \bar{A} represents total factor productivity.
 - a. If capital per person in Brazil is 0.3446 and per capita GDP is 0.148, what is the predicted total factor productivity (\bar{A}) for Brazil? Show your work. (8 points)
 - b. Suppose that the predicted \bar{A} for Japan is 0.734. We discussed several theories in class for why there may be differences in Total Factor Productivity (\bar{A}) across countries. Briefly explain why it would be hard to assess whether differences in institutions is the cause of the difference in TFP between Brazil and Japan. (8 points)
2. Gross Domestic Product (GDP) is an important indicator of the economic well-being of a country.
 - a. Suppose that the stock of inventories in a country increased from \$10 billion at the end of 2022 to \$12 billion at the end of 2023. How would this alter the GDP calculation for 2023? What problem do we run into when we do not adjust for changes in inventories?(6 points)

- b. If exports are products that are produced by country A and sold to country B, why are they included when measuring GDP for country A? Briefly explain. (5 points)

The following graph represents real and nominal GDP from 2012 to 2022 in a hypothetical country. Use this graph for parts 'c' and 'd'.



- c. Why is this graph different from the usual relationship that we expect to see between nominal GDP and real GDP? What is the reason for this difference? Briefly explain. (8 points)
- d. The dashed line representing nominal GDP has a couple of instances where it is decreasing. Does this mean that this country is producing a lower quantity of goods and services than the year before? Briefly explain. (8 points)

- e. When comparing the purchasing power of GDP between two countries, we need to make two adjustments. One of these is that the two countries use different currencies (e.g. dollar in the US and peso in Mexico). What other adjustment do we need to make? Briefly explain. (5 points)

3. Production functions in economics are used to depict the relationship between different inputs (e.g. K and L) and output (Y). Suppose that a production function displays increasing returns to scale. If the amount of capital (K) doubles, while the amount of labor (L) stays the same, which of the following statements is true for certain (assume there are no other inputs). Explain how you arrived at your answer. (8 points)
 - a. Output more than doubles
 - b. Output doubles
 - c. Output increases, but less than double
 - d. Output increases, but it cannot be determined by how much
 - e. Output may decrease

4. We discussed inflation (changes in the CPI) and the quantity theory of money in class.
 - a. The quantity theory of money equation ($M_t V_t = P_t Y_t$) can be used to depict what causes inflation. Convert the quantity theory of money equation to growth rates ($\bar{g}_M, \bar{g}_P, \bar{g}_Y$) and explain how it can be used to calculate inflation (assume $\bar{g}_V = 0$) (8 points)

- b. Suppose ticket prices for the local team's NBA games have gone up from \$20 to \$50 between 2015 and 2023. Your friend notes that “the price of milk went up during that same time period from \$2 to \$4, so the tickets to games are going up to by more than the CPI.” Is your friend correct? Briefly explain. If not, do you think he is overstating or understating the CPI? Or is there not enough information to determine.(8 points)

5. Suppose an economy is represented by the following Cobb-Douglas production function:

$$Y = \bar{A}K^{1/4}L^{3/4}$$

- a. Calculate the marginal product of labor. (5 points)
- b. What is the intuition (non-technical reason) behind the positive correlation or comovement between the amount of capital in the economy and the marginal product of labor? (8 points)
- c. Does your answer to part ‘b’ contradict the idea that we expect diminishing marginal product of labor? Briefly explain. (8 points)
- d. What would happen to the real wage (w) in the economy described in this question if the amount of capital decreased? Briefly explain. (7 points)