

Principles of Economics and Management I

Ciências ULisboa · MMAEG · 2026/2027

Problem Set 8 · GDP, Measurement and Growth

Session 8 · LN08

Exercise level: [Easy] routine / warm-up [Medium] typical test level [Hard] challenge (above test level, to consolidate mastery)

1. (2 points) [Easy] **GDP from the expenditure side.** In an economy (billion €): $C = 120$, $I = 40$, $G = 50$, exports = 30 and imports = 45.
 - (a) (1 point) Compute GDP.
 - (b) (1 point) Compute net exports and interpret the sign.
2. (2 points) [Easy] **What counts in GDP.** State, with justification, whether each operation enters Portuguese GDP for 2026.
 - (a) (1 point) (i) The purchase of a house built in 2010. (ii) The monthly fee of a private daycare center.
 - (b) (1 point) (iii) Unpaid housework. (iv) The purchase of shares on the stock exchange.
3. (3 points) [Medium] **Nominal, real and the deflator.** An economy produces only bread and books:

	2024		2025	
	Quantity	Price (€)	Quantity	Price (€)
Bread	10	2	12	2.50
Books	5	20	6	22

- (a) (1 point) Compute nominal GDP for 2024 and 2025.
 - (b) (1 point) Compute real GDP for 2025 at 2024 prices and the real growth rate.
 - (c) (1 point) Compute the 2025 deflator (2024 base = 100) and the implied inflation.
4. (3 points) [Medium] **Compound interest and the rule of 70.**
 - (a) (1 point) An economy grows 2% a year. How many years does it take to double GDP (exact value and by the rule of 70)?
 - (b) (1 point) And at 3.5% a year?
 - (c) (1 point) Compare the level of GDP after 50 years under the two scenarios.
5. (5 points) [Hard] **Growth accounting.** The aggregate production function is $Y = AK^{1/3}L^{2/3}$. Between 2015 and 2025, Y grew 25%, K grew 30% and L grew 10%.
 - (a) (2 points) Derive the decomposition of growth in rates.
 - (b) (2 points) Compute the contribution of capital, of labor, and the residual.
 - (c) (1 point) Interpret the residual and its long-run importance.
6. (5 points) [Hard] **The Solow steady state.** In per capita terms, $y = k^{1/2}$. The saving rate is $s = 0.25$ and depreciation $\delta = 0.05$, with no population or technology growth.
 - (a) (2 points) Write the accumulation equation and the steady state condition.
 - (b) (2 points) Find k^* , y^* and c^* .
 - (c) (1 point) Saving rises to $s = 0.36$. Recompute and comment on the effect on growth.