Task

a) Explain what is meant by the term potential output and explain what challenges the German economy faces with regard to this parameter in view of its demographic development.

b) From the given values in the table, determine mathematically exact the nominal economic growth of Germany of the year 2022. In addition, according to press reports of Jan. 25, 2023, the German government now assumes no recession this year, but rather real growth of 0.2% and an overall economic price increase of 5%. From this, determine the forecast nominal GDP for 2023 and its growth rate.

c) In the long term, a reduction in potential growth to 1% p.a. is assumed due to the difficult political and economic environment. If this is used as a basis for the real growth of the economy up to 2030 and it is assumed that nominal GDP in Germany will be 6 trillion euros in 2030, the expected average annual price development up to 2030 can be derived from this. Determine this annual average price development in percent mathematically exactly.

	GDP (nominal)	GDP-Index (nominal)	Growth rate GDP (nominal)	GDP-Index (real)	Growth rate GDP (real)	GDP-Deflator	Growth rate GDP-Deflator
2022	3,9	100,00		100,00	1,90%	100,00	6,00%
2023							
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
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.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
2030							

Task:

a) Define the economic variable consumer price index with its quantitative components, and explain what general problem in price measurement arises from the increasingly rapid technological progress in digital products.

b) Determine the inflation rate of the year 2022 from the given values for the three goods categories *energy, industrial goods* and *other goods*.

c) Due to the price cap for energy, a constant price development for energy is assumed for the year 2023. Overall, inflation is forecast to be 10% in 2023. For the category of *other goods*, however, the price increase is expected to be only 9%. How much would the prices of industrial goods have to increase in 2023? In addition, mathematically exactly determine the annual average value of the price increase in percent for the category of *other goods* for the period from 2021 to 2023 based on the given values.

	Energy		Industrial goods		Other goods		Basket	CPI	Inflation
	Price [Euro]	weight	Price [Euro]	weight	Price [Euro]	weight			
2021	2	0,15	3	0,2	4			100	
2022	2,1	0,15	3,1	0,2	4,1				
2023		0,15		0,2					

Task:

The economic relationships in the goods and money market are given by the following functions:

$C(y)=40+0,7 \cdot y$ $\qquad$ $I(i)=10-20i$ $\quad$ $G=10$ $\quad$ $L(y,i)=2y-100i$ $\qquad$ $M=400$ $p=4$

y:= Income; i:= interest rate; m:= real money ; G:= government expenditure; C(y):= consumption; I(i):= Investment; L(y,i):= money demand; M:= nominal money; p:= price level

a) Determine the functional relationship of the average consumption rate as a function of income y, and from this explain the economic significance of autonomous consumption $c_0=40$.

b) Determine graphically and mathematically the simultaneous equilibrium in the money and goods markets within the IS/LM model and explain qualitatively what is meant by the crowding-out effect.

c) Assume that the long-run equilibrium income y_{long} (AS-long-run) is lower than the equilibrium income as (b). Argue economically via the AD curve (qualitatively or mathematically) why the long-run price level p_{long} must then be greater than the given price level p=4.

Task:

a) Explain what is generally understood by the yield curve.

b) In a country, short-term interest rates are 0.5% and long-term interest rates are 2.5%. Determine the short-term expected interest rates according to the expected value theory.

c) Explain what is meant by liquidity premium theory and, using the given data from (b), determine approximately how high the liquidity premium would have to be in order that, together with expected value theory, this structure of the yield curve could be interpreted as a recession signal.

Task 1 (25 Points):

a) Differentiate between the concepts of real and nominal economic growth and explain the conceptual difference between the calculation of real economic growth and real interest rates.

b) In 2021, nominal GDP in Germany was 3.6 trillion euros. In 2022, GDP was 3.87 trillion euros and the macroeconomic price level increased by 5.5% compared to the previous year. Furthermore, assume a real stagnation of the overall economic performance in 2023. From this, calculate mathematically exactly the nominal and real economic growth of the year 2022, as well as assuming that nominal GDP in 2023 is 4.0 trillion. euros, calculate the (expected) overall price increase rate for 2023.

	BIP (nominal)	BIP-Index (nominal)	Wachstumsrate BIP (nominal)	BIP-Index (real)	Wachstumsrate BIP (real)	BIP-Deflator	Wachstumsrate BIP-Deflator
2021		100,00		100,00		100,00	
2022							
2023							

Task 2 (25 Points):

Assume the following functional relationships within the IS/LM model:

C(y)=80+0,8·y   I(i)=10-20i   G=20   L(y,i)=2y-100i   M=100 p=2

y:= Income; i:= interest rate; m:= real money ; G:= government expenditure; C(y):= consumption; I(i):= Investment; L(y,i):= money demand; M:= nominal money; p:= price level

a) Explain briefly the dependencies in the given money demand function, taking into account the motives of money holders.
b) Determine the equations of the IS and LM curves as well as the simultaneous equilibrium on the money and goods market within the IS/LM-model. Also, plot the equilibrium in a suitable diagram.
c) Assume a 20% increase in the price level in the course of the current price increases, and explain graphically within the IS/LM-model what effects this has on the equilibrium income and the equilibrium interest rate. Also explain how fiscal policy could be used to keep the equilibrium income at the same level as in task (b) despite the price increase.

Task 3 (25 Points):

a) In July 2021, the ECB changed its inflation target based on the annual rate of change of the harmonized consumer price index in the medium term from "*close to but below 2%*" to "*symmetric around 2%*". Against the background of inflation developments over the past 10 years, explain why this change has been made, also addressing the high rates of price increases in the recent past.
b) Consider the weighted division of the CPI into the components *housing, water, electricity, gas and other fuels (WWSGB)* and *Rest* with the following given values of the years 2021 and 2022. Furthermore, use the current inflation forecast of the HRI (Handelsblatt Research Institute) of 3% for the overall index and the index value 120, for the subindex of the component *WWSGB* from in 2023. From these values, determine mathematically exact the inflation rate for 2022, the rate of change of the *Rest* component for 2023, and the (expected) average inflation rate p.a. of the *HWEGF* subcomponent.

	WWSGB		Rest		VPI	Inflation
	Index	Gewicht	Index	Gewicht		
2021	100,00	0,25	100,00	0,75		
2022	118,00	0,25	103,20	0,75		
2023		0,25		0,75		

c) After the ad hoc publication of the 2022 inflation rate for Germany in January 2023, this value has been corrected downward by one percentage point only one month later in February 2023 due to the reweighting of the CPI subcategories. Assume that the value you calculated in (b) corresponds to the currently reported inflation rate for the German economy in 2022. Given this assumption, determine the original weighting of the *HWEGF* category before the February 2023 CPI correction.

Task:

a) Explain the four different types of unemployment, especially with regard to their time horizon, giving one example each.
b) Explain the basic differences between Keynesian and neoclassical theory, especially with regard to the respective assumptions.
c) On Thursday, June 15, 2023, the ECB raised the key interest rates by another 25 basis points. Explain why, in view of the yield curve given in the diagram, this new increase is viewed controversially.

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