1. **General macro concepts (20 points). Multiple choice: encircle correct answer.**

i. The following data are from an economy with 2 goods:

	2009	2010
Price good X	€ 10	€ 11
Price good Y	€ 41	€ 45.1
Quantity good X	90	100
Quantity good Y	100	90

What is the inflation rate measured by the CPI? Fix 2009 as the base year.

a) 10%
b) 1.1
c) 7.3%.
d) None of the above is correct.

ii. Which group is most likely to gain from inflation?

a) Creditors
b) Debtors
c) Both of the above
d) None of the above

iii. Suppose that the US division of General Motors sells 100 engines to Peugeot, based in France, which are to be used in production next year. Which of the following statements is correct?

a) This increases consumption in France and decreases the consumption in the US.
b) This increases inventories in France and increases net exports of the US.
c) This decreases investment in the US, but increases net exports of the US
d) None of the above are correct.

iv. Money demand M^d/P is given by the function $L(i, Y) = kY/i$ where Y is real income, i is the interest rate, and k is a constant. If k = 2 and i = 0.1, what is the velocity of money?

a) 20
b) 0.05
c) It's not possible to answer this question without the knowledge of the price level.
d) 2Y

v. An economy has a monetary base of 1 bln euro. Calculate the money supply in case all money is held as demand deposits and banks hold 20 percent of deposits as reserves.

a) 5 bln euro
b) 20 bln euro
c) 0.8 bln euro
d) 1.25 bln euro

vi. Consider a labour market of a country. Assume that 10% of employees lose their jobs every year. Once unemployed, 30% of people finds a new job within a year. There are 2 million unemployed people. Which of the following is correct?

a) The unemployment rate is 33.3%.
b) The total labour force is 10 million people.
c) 0.2 million unemployed people find a job each year.
d) None of the above

2. **A Classical economy (20 points).** An economy, without money, is described with the following accounting rules and behavioural equations:

$Y = C + I + G + X - M$, $Y = 360$, $G = 160$,

$\boldsymbol{C}(Y - T) = 20 + 3/4\,(Y - T)$, $T = 120$

$\boldsymbol{I}(r) = 80 - 8r$, $X = 100$, $M = 120$

where: Y = income/production; G = government spending; T = taxes; C = consumption; I = investment; X = exports; M = imports; r = domestic interest rate;

[provide calculations, as well as numerical answers].

a. Compute private savings, total savings and net capital inflow.

b. Compute total investment in equilibrium.

c. Compute what happens to income Y when taxes are decreased from the initial $T = 120$ to $T = 80$. (Use the *tax multiplier*.)

d. Can you think of arguments of why the tax decrease may not lead to a change in GDP and its components. Give the name of the theory that proposes this, and provide reasons why this theory may be incorrect.

3. **Economic Growth (20 points).** Use the Solow model for these questions.

a. Give the law of motion of capital in the Solow growth model and write down the steady state condition.

b. Assume the production function is given by: $Y = K^{0.5}L^{0.5}$. Derive the expression for output per capita (y). Next, assume that the savings rate is 0.2, the depreciation rate is 0.1 and there is no population growth. Calculate the steady-state capital per capita (k).

c. Continuing with the above example, the savings rate now increases. Explain what happens to the steady state capital stock per capita and to consumption.

d. Explain the intuition behind the condition that pins down the Golden rule-capital stock. Why can the steady state per capita-consumption increase following a decrease in the savings rate.

4. IS-LM and Mundell-Fleming Model (20 points).

a. Draw the IS- and LM-curves (for a closed economy) in the graph below (label the curves and axes!). Show what happens to output and the interest rate in the short run following a decrease in the money supply. Describe what happens to the components of output (consumption, government spending and investment).

b. For the following policy shocks in the US, use the IS-LM model to predict how the interest rate (r) and income (Y) change in the short run (use '+' or '-'). Assume the US is a closed economy.

	r	Y
i. The Central Bank sells large amounts of mortgage securities that it had bought from banks in 2008.		
ii. The government hires more workers, but simultaneously raises taxes such that the budget deficit does not change.		
iii. The Central Bank lowers the reserve requirements for commercial banks.		
iv. The government offers young firms special tax benefits.		

c. Consider a small open economy with a flexible exchange rates. Draw the IS^* and LM^* curves (label the curves and axes!) and show the short-run effects of an increase in government spending. Describe what happens to expenditures, Y, its components, C, G, I, NX, the interest rate, r, and exchange rate, e (use '+', '-' or '=', for example: Y=, C+, I-, ...).

5. **AS-AD and Phillips-Curve (20 points).**

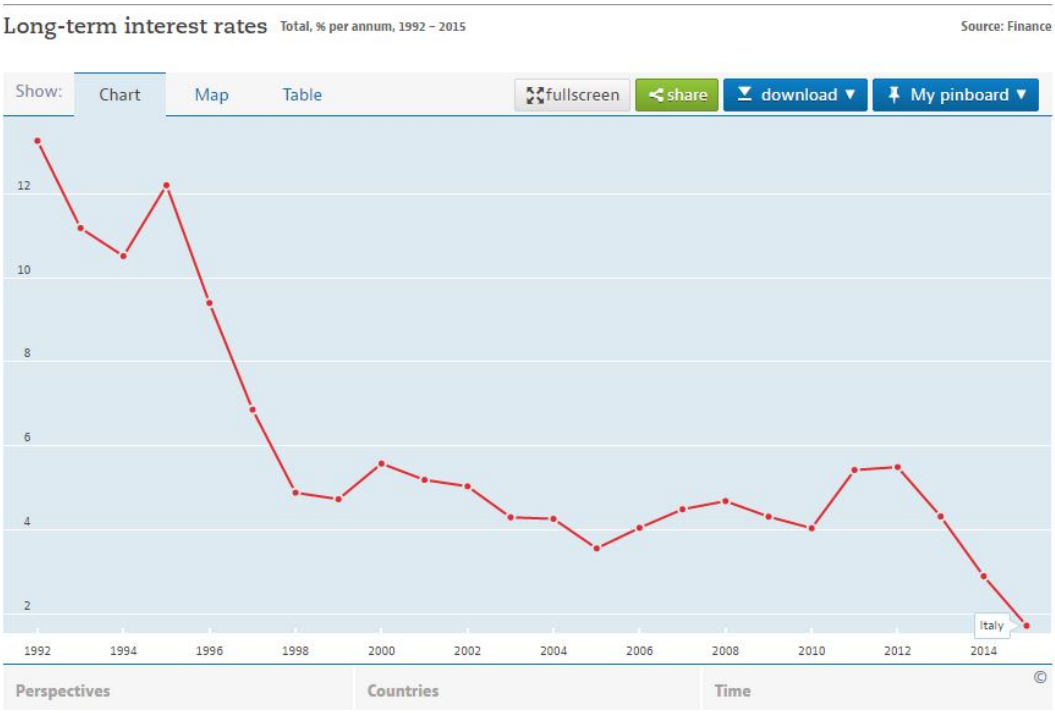
a. State three theories that explain why the aggregate supply curve is upwards sloping? What happens to the AS curve when price expectations increase?

b. In the AS-AD model, short run stabilization policy does not affect long run employment and output. Discuss theoretical arguments why this may or may not be plausible.

c. What are two hypotheses about the formation of inflation expectations? Explain how these are relevant for the magnitude of the 'sacrifice ratio'? What could the Central Bank do to reduce the 'sacrifice ratio'?

6. **Statistical Concepts in Economics (bonus question 5 points).**

The following chart plots the nominal interest rates for long-term government debt in Italy before and after the adoption of the Euro in 1999. Based on this graph, can we conclude that it has become cheaper for the Italian government to borrow since the introduction of the Euro? Discuss, with reference to concepts discussed in the course.



(source: https://data.oecd.org/interest/long-term-interest-rates.htm#indicator-chart)