1. **General Macro Concepts (36 points, 12 questions, i through xii).**
Multiple choice: encircle correct answer.

i. The following data are from an economy with 2 goods: intermediate good X which is used to produce final good Y:

	2016	2017
Price intermediate *X*	€ 10	€ 14
Price final good *Y*	€ 40	€ 50
Quantity intermediate *X*	100	75
Quantity final good *Y*	50	60

How much higher is real GDP in 2017 than in 2016?

a) 20%
b) 25%
c) 30%
d) None of the above are correct.

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

	2016	2017
Price *X*	€ 10	€ 11
Price *Y*	€ 10	€ 12
Quantity *X*	100	200
Quantity *Y*	100	50

Which statements about the Laspeyres and Paasche price indexes for consumption of X and Y are true?

a) The Laspeyres index shows higher inflation than the Paasche index
b) The Paasche index shows higher inflation than the Laspeyres index
c) Both indexes show the same inflation rate
d) There is no inflation in this economy.

iii. Consider an economy with 2 firms. Firm A produces 100 euro worth of finals goods using its own workers and 50 euro of purchased services. Firm B produces 50 euro of services using only labor, which it sells to firm A.

a) Value added of the total economy is 100.
b) Value added of firm B is 0, because it uses no intermediate inputs.
c) Value added of firm A is 50 minus wages paid to its workers.
d) Value added of the total economy is 150 plus the wages paid to all workers.

iv. Which of the following events will ***not*** result in depreciation of the US dollar?

a) China decides to sell part of its Central Bank dollar reserves.
b) The US government increases its defense expenditures.
c) Russia increases tariffs on imported US goods.
d) New oil fields are discovered in the US, reducing its imports of mid-east oil.

v. Assume that money supply increases 3%, GDP increases 1%, and the velocity of money increases 2%. What is the inflation rate, according to the Quantity Theory of Money?

a) 6%
b) 5%
c) 4%
d) -2%

vi. What instrument can the Central Bank use to influence the money supply?

a) The reserve ratio
b) The inflation rate
c) The currency-deposit ratio
d) None of the above

vii. 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 10 percent of deposits as reserves.

e) 10 bln euro
f) 20 bln euro
g) 0.8 bln euro
h) 1.25 bln euro

viii. The Government could spend a given budget either to reduce the job separation rate from 4% to 2% or to increase the job finding rate from 36% to 38%. Which policy choice leads to **lower** steady-state unemployment.

a) Increase job finding rate from 36% to 38%
b) Decrease job separation rate from 4% to 2%
c) Both have the same effect on unemployment
d) There is not enough information to provide an answer

ix. Which is an advantage of conducting policy via **rules**?

a) Rules reduce the probability that policymakers behave opportunistically (because goals of policymakers may not coincide with goals of the population at large).
b) Rules reduce the probability of a 'political business cycle' (government spending aimed at boosting the economy just before elections).
c) Monetary policy conducted via rules may lower inflation expectations.
d) All the above are advantages of policy via rules.

x. Which of the following events would affect the deficit under **capital budgeting**?

a) The retirement age for public pensions is increased.
b) The department of defense purchases new foreign-made fighter jets.
c) The government postpones maintenance of bridges.
d) All the above would affect the deficit under capital budgeting.

xi. What are the sources of **gains from trade** in the Krugman model?

a) Differences in technology.
b) Increasing returns to scale and love-of-variety.
c) Firm selection and reallocation of resources within the economy.
d) Differences in endowments or preferences.

xii. Assume two countries, A and B, that produce guns and butter, using labor. Country A produces a gun using 2 hours of labor, and a pack of butter using 1 hour. Country B uses 2 hours to produce a pack of butter and 10 hours to produce a gun. Which statement is true.

a) Neither country has a comparative advantage in trade.
b) Country A has a comparative advantage in both guns and butter.
c) Country A has a comparative advantage in guns, country B in butter.
d) Country A has a comparative advantage in butter, country B in guns.

2. **A Classical economy (16 points).** An economy, without money, is described with the following accounting rules and behavioral equations:

Y = C + I + G + X - M, Y = 1000, G=500,
C(Y-T) = 100 + 2/3 (Y-T), T=400
I(r) = 300 – 25r, X=400, M=600

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. What variable adjusts to bring savings and investment in balance? What is its equilibrium value?

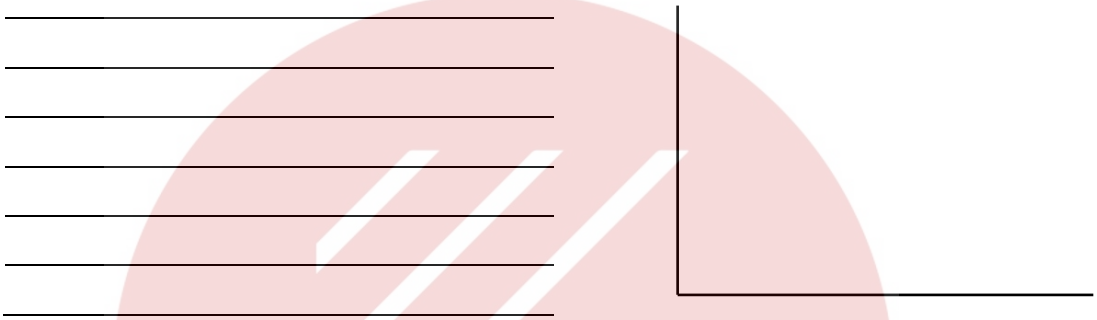
b. Compute consumption, total savings, the trade surplus, and net capital inflow.

c. Use the Keynesian multiplier to compute what happens to output and investment, when autonomous investment increases by 50, given unchanged interest rate.

d. Given the change to investment in c. above, compute the new level of total savings.

3. **Economic Growth (16 points).** Use the Solow model for these questions.
   a. Write down the steady-state equation for the Solow model. Which flows are equal in the steady state? If production is given by: $Y = K^{0.5}L^{0.5}$, solve for the steady state capital (K) per worker (L), that is k=K/L, in terms of the exogenous model parameters.

   b. Draw the graph with output per worker and capital per worker and describe what happens when the depreciation rate becomes higher in the Solow model.



   c. Starting from a steady state in periods before time *t*, draw the time path of output per worker (Y/L), when a hurricane destroys some of the capital stock at time *t*.

   d. Assume that, initially, the marginal product of capital is higher than the depreciation rate. Draw the time path of consumption per worker (C/L) when the savings rate is decreased at time *t*.

4. IS-LM and Mundell-Fleming Model (16 points).

a. Draw the IS- and LM-curves (for a closed economy) in the graph below. (Do not forget to label the axes.) Show what happens to the economy in the short run following an increase in liquidity preference. Describe what happens to the components of expenditures.

b. For the following shocks to the EU economy (assume the EU is a closed economy), show with a '+' , '-' or '=' what happens to the interest rate (r) and income (Y) in the short run.

	r	Y
i. The invention of energy-efficient transportation equipment boosts investment.		
ii. The Central Bank reverses quantitative easing by selling bonds.		
iii. Households increase their savings owing to worries about Brexit and trade wars.		
iv. A fear of increased financial volatility causes people to keep more wealth in the form of money.		

c. Consider a small open economy with a flexible exchange rate. Draw the IS* and LM* curves (label the axes) and show the effect of an increase in tariffs on imports. Describe what happens to expenditures Y, its components, C, I, NX and to interest rate 'r' and exchange rate 'e'. (use + ,-, =. For example: Y=, C+, I-, ...)

5. **AS-AD and Phillips-Curve (16 points).**

a. The supply curve of a firm depends on its real costs. For this reason, a change in the aggregate price level will not change the supply of any firm, nor for the aggregate economy. State three theories for why this conclusion may be wrong.

b. Write down the relationship between the price level and output in the sticky price model of aggregate supply. Describe what happens to real wages if the economy goes into a recession. Is this prediction supported by empirical evidence?

c. Write down the Phillips curve. Consider the case that unemployment is 2 percentage-points lower than the natural rate for a few consecutive years. Describe, under two different assumptions of expectation formation, what will happen to inflation over these years.