Problem Set 1

ECON 304 – Intermediate Macroeconomics

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Department of Economics • Fall 2025

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! Assignment Information

Due Date: September 12, 2025
Total Points: 3.0
Student Name: _____
Instructions: Show all work clearly. Partial credit may be awarded for correct methodology even if the final answer is incorrect. Groups of no more than three are permitted.

Submission Instructions

1. Show all mathematical work clearly
2. Include graphs where requested
3. Explain economic intuition behind your answers
4. Submit by **September 12, 2025** at the beginning of class.
5. Late submissions will be penalized 10% per day

Office Hours: Wednesday, 12:00-2:00 PM; Friday, 12:00-1:00 PM; or by appointment

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Problem 1: Keynesian Multiplier

Points: 0.5

Given the equilibrium condition $Y = C + I + G$, where $C = c_0 + c_1(Y - T)$, $I = \bar{I}$ and $G = \bar{G}$:

Question 1.1

Derive the equilibrium output Y^* in terms of the parameters of the model – i.e., c_0, c_1, T, $\bar{I}$, and $\bar{G}$. Include a graph to emphasize the equilibrium level of output.

Question 1.2

Derive the partial derivative of the equilibrium output Y^* with respect to each of the parameters.

Question 1.3

Discuss the behavior of $\dfrac{\partial Y^*}{\partial c_1}$. Be sure to address what must be true for the economic system to be stable.

Question 1.4

Suppose the federal government cuts taxes by 30% ($T_2 = 0.7T_1$), by how much does the equilibrium output change?

Problem 2: IS-LM

Points: 1.0

Question 2.1

Derive the investment-saving (IS) relation. What does the IS relation represent? Explain.

Question 2.2

Derive the liquidity-money (LM) relation. What does the LM relation represent? Explain.

Question 2.3

Consider the financial market with money demand $\frac{M^D}{P} = L(Y,i) = Y(l_0 - l_1 i)$ and money supply $\frac{M^S}{P} = \frac{\bar{M}}{P}$.

For the goods market, aggregate demand is $Z = c_0 + c_1(Y - T) + \bar{I} + G$ where the government runs a balanced budget. Solve for the equilibrium output and nominal interest rate.

Given parameters: $P = 1$, $l_0 = 5$, $l_1 = 2$, $\bar{M} = 490$, $c_0 = 8$, $c_1 = 0.8$, $T = 10$, $\bar{I} = 10$.

Problem 3: Response to the Great Recession

Points: 1.5

Use the equations from the previous question to illustrate changes to the economic system and your policy response.

Question 3.1

In 2007-2008, falling house prices caused aggregate demand to fall and the financial system teetered on the verge of collapse. For simplicity, let's assume this is represented by a decline in autonomous expenditure $c_0' = 1$. Estimate the new equilibrium, graph the Keynesian Cross, and estimate the change in output through the Keynesian multiplier.

Question 3.2

You are the chair of the Federal Reserve, what is your immediate response to the crisis? Illustrate your open market operations by making a change to one of the equations previously used. What is the new equilibrium and provide intuition for why it has shifted.

Question 3.3

As chair of the Fed, are you satisfied with the results of your monetary operations? Are you concerned about the efficacy of future monetary policy?

Question 3.4

How should the federal government respond to this crisis? Illustrate graphically and algebraically.

Extra Credit

Points: 0.3

During the Great Recession the banking system nearly collapsed, what happened to the balance sheets of financial intermediaries and how did the Federal Reserve respond to prop up the system?

This problem set covers fundamental macroeconomic models essential for understanding business cycles and policy responses. Focus on mastering the mathematical relationships and their economic interpretations.