Problem Set 1

Note: Unless otherwise specified, each question is worth one point. Each problem set has at least five questions. Extra points will be rewarded for extra work done correctly. Please keep your answers clear, concrete, and concise.

1. In an autarky (self-sufficient) economy, Biwei can choose to produce either apple, banana, or cherry. His hourly productivity is shown in the table below.

Products	Productivity (units per hour)	Opportunity Cost (minutes)
Apple	10	
Banana	20	
Cherry	4	

1) Suppose Biwei works for one hour and produces a combination of apples and bananas. What is the opportunity cost of one apple in term of bananas? Draw this PPF in a graph.
2) Suppose Biwei only works for one hour and produces a combination of apples and cherries. What is the opportunity cost of one apple in term of cherries? Draw this PPF in a graph.
3) Suppose Biwei would like to consume a combination of (5a, 10b, 2c), what is the amount of time he must sacrifice for this production bundle?
4) What is the opportunity cost of each good measured in term of time? Fill in the table above
5) Suppose the price of an apple Pa=$10, with a combination of (5a, 10b, 2c) produced, given the opportunity cost of an apple in terms of bananas or cherries calculated in (1) and (2), what would be the price of a banana and the price of a cherry? What is the total market value of this bundle?
6) Suppose next year Biwei's productivity in apple increases to 12 units per hour while productivity in banana and cherry remains the same, what is the new opportunity cost of an apple in terms of bananas? And the new opportunity cost of an apple in terms of cherries?
7) With the productivity in apples increasing to 12 units per hour while others remain the same, Biwei divides one hour and a half (or 90 minutes) equally to the production of three goods, what is the production bundle he can obtain?
8) With the production bundle achieved in (7) and Pa=$10 for an apple, what is the corresponding price of a banana? And the corresponding price of a cherry?
9) Is money necessary in Biwei's economy? If not necessary, why do the goods have prices?
10) Why does the apple price remain the same even though there is an increase in its productivity?

2. The following table shows the unit prices and quantities of three different goods produced in Biwei's economy at different periods.

Products	T=1		T=2		T=3	
	Price	Quantity	Price	Quantity	Price	Quantity
Apple	$ 10	5	$ 12	5	$ 10	6
Banana	$ 5	10	$ 6	10	$ 6	10
Cherry	$ 25	2	$ 30	2	$ 30	2
Nominal Income						
Real Income						

1) Calculate Biwei's nominal income at T= 1, 2, 3 and fill in the table.
2) Calculate Biwei's the real income at T=1, 2, 3 with base year T=1 and fill in the table.
3) Using GDP deflator method, calculate the inflation rate from T=1 to 2, and from T=2 to 3.
4) Using CPI method with base year T=1, calculate the inflation rates from T=1 to 2, and T=2 to 3.
5) Based on quantity theory of money, suppose transaction velocity equals one, what are the money stock values at T=1, 2, 3, respectively?
6) From T=1 to T=2, according to the quantity theory, what causes P to rise? [Hint: V, Y is constant.]
7) From T=2 to T=3, according to the quantity theory, what causes P to fall? [Hint: V, M is constant.]
8) If transaction velocity doubles at T=4, how would the prices change if the money stock and output remain constant?

3. In an economy where the velocity of money is constant, real output grows by 3 percent per year, the money stock grows by 8 percent per year, and the nominal interest rate is 9 percent. What is the growth rate of nominal output? the inflation rate? the real interest rate? (0.5 point)

4. An economy has the following money demand function: $(M/P)^d = 0.2Y/i^{1/2}$

1) Derive an expression for the velocity of money. What does velocity depend on? Explain why this dependency may occur.
2) Calculate velocity if the nominal interest rate i is 4 percent.
3) If output Y is 1,000 units and the money supply M is $1,200, what is the price level P?
4) Suppose the announcement of a new head of the central bank, with a reputation of being soft on inflation, increases expected inflation by 5 percentage points. According to the Fisher effect, what is the new nominal interest rate?
5) Calculate the new velocity of money.
6) If, in the aftermath of the announcement, both the economy's output and the current money supply are unchanged, what happens to the price level? Explain why this occurs.
7) If the new central banker wants to keep the price level the same after the announcement, at what level should she set the money supply?

5. Aggregate demand and supply (AD-AS model)

1) What are the major components of aggregate demand? What government policies can change AD?
2) What is a long run aggregate supply curve? What determines its level? Why is not it affected by the aggregate price level?
3) What is a short run aggregate supply curve? Why can the price level affect output in the short run?
4) According the quantity theory, if money is neutral, what is the implication for the aggregate supply curve? If money is not neutral, what is the implication for the aggregate supply curve? Explain.
5) Apply the AD-AS model to explain the short run business fluctuation and long run economic growth. Show your explanations in separate graphs.
6) In the past several months, the U.S. government took drastic actions to support the economy, including unprecedented monetary expansion and fiscal relief programs. Apply the AD-AS model to illustrate the effects of government policies on the economy in graphs.

6. The following equations describe an economy.

$Y=C+I+G$

$C=50+0.75\ (Y-T)$

$I=150-10r$

$M_D/P = Y-50r.$

$G=250,\ T=200,\ M_S=3000,\ P=4.$

1) From the above list, use the relevant set of equations to derive the IS curve. Graph the IS curve on an appropriately labeled graph.
2) From the above list, use the relevant set of equations to derive the LM curve. Graph the LM curve on the same graph you used in part (1).
3) What are the equilibrium level of income and the equilibrium interest rate?

7. Farmer Biwei has two long-term investment opportunities: Invest in 100 apples and harvest 5 apples per year. Or, invest in 100 bananas and harvest 10 bananas per year. (0.5 point)

1) Which are the real rates of returns on apples and bananas, respectively?
2) Suppose the current prices of apples and bananas are the same $1 per unit, which asset should the farmer invest in? Should the farmer always invest more in the asset with a higher rate of return?
3) Suppose the apple price is $1 each and banana price is $0.4 each. What is the nominal return on apples? on bananas?
4) Suppose the apple price remains the same at $1 but the banana price drops from $1 to $0.4. Which product should farmer Biwei invest in if he has perfect foresight? Should he always invest more in the asset with a higher real rate of return?
5) What is the different between real rate of return and nominal rate of return? Which matters in investment decisions?