**Instructions**: You need to answer all the questions in English only. You have 100 minutes.

1. (6 points) The quantity of coffee demanded, *Q*D, depends on the price of coffee, *P*c, and the price of tea, *P*T. The quantity of coffee supplied, *Q*S, depends on the price of coffee, *P*c, and the price of electricity, *P*E , according to the following equation:

|  |  |
| --- | --- |
|  | *Q*D = 17 – 2 *P*c + 10 *P*T |
|  | *Q*S = 2 + 3 *P*c – 5 *P*E |
| a. | (2 points) If the price of tea is $1.00 and the price of electricity is $1.00, what is the equilibrium price and quantity of coffee? |
| b. | (2 points) What is/are the exogenous variable(s) in this model? |
| c. | (2 points) What is/are the endogenous variable(s) in this model? |

**Answer:**

|  |  |
| --- | --- |
| a. | The equilibrium price is $6.00 and the equilibrium quantity is 15. |
| b. | *P*T and *P*E |
| c. | *P*c , *Q*S and *Q*D |

2. (10 points) Exhibit: Quantity Consumed and Price of Good

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Base Year | | Later Year | |
| Price of good A | 100 | | 200 | |
| Quantity of good A | 100 | | 150 | |
| Price of good B | 100 | | 100 | |
| Quantity of good B | 100 | | 100 | |

In the exhibit, the citizens of country XYZ come to desire more of good A. As a result, the quantity and price of the good both rise.

|  |  |
| --- | --- |
| a. | (3 points) Compute nominal GDP in the base year and later year. |
| b. | (3 points) Compute real GDP in the base and later years (in base-year prices). |
| c. | (2 points) Compute the GDP deflator in the later year, using your answers to parts a and b. |
| d. | (2 points) Compute a fixed-weight price index for the later year, using the base-year quantities as weights. |

**Answer:**

|  |  |
| --- | --- |
| a. | Base-year nominal GDP = 20,000. |
|  | Later-year nominal GDP = 40,000. |
| b. | Real GDP in base year = 20,000. |
|  | Real GDP in later year = 25,000. |
| c. | GDP deflator in later year = 1.6 |
| d. | Fixed-weight index = 1.5 |

3. (4 points) Explain which expenditure category of GDP changes and the direction of the change that results for each transaction described.

|  |  |
| --- | --- |
| a. | (2 points) A domestic business purchases a domestically produced computer to use in a business office. |
| b. | (2 points) A domestic business produces a computer that is sold to a foreign company. |

**Answer:**

|  |  |
| --- | --- |
| a. | Investment spending increases. |
| b. | Exports (and net exports) increase. |

4. (20 points) Consider a production function for an economy:

where *L* is labor, *K* is capital, and *N* is land. In this economy the factors of production are in fixed supply with *L* = 100, *K* = 100, and *N* = 100.

|  |  |
| --- | --- |
| a. | (6 points) What is the level of output in this country? |
| b. | (7 points) Does this production function exhibit constant returns to scale. Demonstrate by example. |
| c. | (7 points) If the economy is competitive so that factors of production are paid the value of their marginal products, what is the share of total income will go to land? |

5. (10 points) To increase tax revenue, the U.S. government in 1932 imposed a 2-cent tax on checks written on bank account deposits. (In today’s dollars, this tax would amount to about 34 cents per check.)

|  |  |
| --- | --- |
| a. | (5 points) How do you think the check tax affected the currency–deposit ratio? Explain. |
| b. | (5 points) Many economists believe that a falling money supply was in part responsible for the severity of the Great Depression of the 1930s. From this perspective, was the check tax a good policy to implement in the middle of the Great Depression? |

**Answer:**

a. The introduction of a tax on checks makes people more reluctant to use checking accounts as a means of exchange. Therefore, they hold more cash for transactions purposes, raising the currency–deposit ratio *cr*.

b. The check tax was not a good policy to implement in the middle of the Great Depression because it resulted in a decrease in the money supply as people preferred to pay in currency rather than write a check. The money supply falls because the money multiplier, , is decreasing in *cr*.

6. (10 points) Answer the following questions True OR False. Briefly explain your answers. No credit without explanation.

|  |  |
| --- | --- |
| a. | (5 points) On the planet Vulcan, the velocity of money is constant. Real GDP grows by 4% per year, the money supply grows by 10% per year, and the nominal interest rate is 9%. Therefore, the real interest rate is 5%. |
| b. | (5 points) The Federal reserve bank solely controls the money supply in the United States. |

**Answer:**

a. False. Using the notation from class, when velocity is constant we know µ = π + g From the Fisher equation, we know i = r + π. Therefore, µ = (i-r)+g. Plugging in the numbers gives .10 = .09+.04-r. Therefore, r = .03.

b. FALSE. The Federal reserve bank controls the *monetary base*. If *M* is the money supply and *H* is the monetary base, we have *M* = *µH* where *µ* is the money multiple *µ* = (1 + *cu*)*/*(*rr* + *cu*), where the currency/deposit ratio and reserve/deposit ratio are determined by the portfolio decisions of households and banks.

7. (20 points) Consider an economy described by the following equations:

*Y* = *C* + *I* + *G* + *NX,*

*Y* = 500,

*G* = 100,

*T* = 100,

*C* = 25 + 0.75(*Y* − *T*),

*I* = 100 − 5*r,*

*NX* = 50 − 50e,

*r* = *r*\* = 5.

|  |  |
| --- | --- |
| a. | (7 points) In this economy, solve for national saving, investment, the trade balance, and the equilibrium exchange rate. |
| b. | (7 points) Suppose now that *G* rises to 125. Solve for national saving, investment, the trade balance, and the equilibrium exchange rate. Explain what you find. |
| c. | (6 points) Now suppose that the world interest rate rises from 5 to 10 percent. (*G* is again 100). Solve for national saving, investment, the trade balance, and the equilibrium exchange rate. Explain what you find. |

**Answer:**

a) National saving is the amount of output that is not purchased for current consumption by households or the government. We know output and government spending, and the consumption function allows us to solve for consumption.

Hence, national saving is given by:

*S*= *Y – C – G*

= 500 – (25 + 0.75(500 – 100)) – 100

= 75.

Investment depends negatively on the interest rate, which equals the world rate *r*\* of 5. Thus,

*I* = 100 – 5\* 5

= 75.

Net exports equals the difference between saving and investment. Thus,

*NX* = *S – I*

= 75 – 75

= 0.

Having solved for net exports, we can now find the exchange rate that clears the

foreign-exchange market:

*NX* = 50 – 50\*ε

0 = 50 – 50\*ε

ε =1.

b) Doing the same analysis with the new value of government spending we find:

*S*= *Y – C – G*

= 5,00 – (25 + 0.75(5,00 – 1,00)) – 125

= 50

*I* = 100 – 5\*5

= 75

*NX* = *S – I*

= 50 – 75

= –25

*NX* = 50 – 50 \* ε

–25 = 50 – 50\*ε

ε = 1.5.

The increase in government spending reduces national saving, but with an unchanged world real interest rate, investment remains the same. Therefore, domestic investment now exceeds domestic saving, so some of this investment must be financed by borrowing from abroad. This capital inflow is accomplished by reducing net exports, which requires that the currency appreciate.

c) Repeating the same steps with the new interest rate,

*S*= *Y – C – G*

= 500 – (25 + 0.75(500 – 100)) – 100

= 75

*I* = 100 – 5 × 10

= 50

*NX* = *S – I*

= 75 – 50

= 25

*NX* = 50 – 50 \* ε

25 = 50 – 50 ε

ε= 0.5.

Saving is unchanged from part (a), but the higher world interest rate lowers investment. This capital outflow is accomplished by running a trade surplus, which requires that the currency depreciates.

8. (20 points) Consider an economy with the following Cobb-Douglas production function:

|  |  |
| --- | --- |
| a. | (10 points) Derive the equation describing labor demand in this economy as a function of the real wage and the capital stock. |
| b. | (10 points) The economy has 27,000 units of capital and a labor force of 1,000 workers. Both capital and labor are supplied inelastically. Assuming that factor prices adjust to equilibrate supply and demand, calculate the real wage, total output, and the total amount earned by workers. |

**Answers:**

a.

The profit-maximizing condition is that the firm hire labor until the marginal product of labor equals the real wage: MPL = W/P

The marginal product of labor is found by differentiating the production function with respect to labor:



In order to solve for labor demand, we set the *MPL* equal to the real wage and solve for *L*:



b.

Given the labor demand equation, we can solve for the real wage:



The total output is given by the production function:

In equilibrium, employment will be 1,000 and the real wage is 10, so the workers earn 10,000 units of output.