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

1. (6 points) The production function for an economy can be expressed as *Y* = *F*(*K,L*), where *Y* is real GDP, *K* is the quantity of capital in the economy, and *L* is the quantity of labor in the economy.

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| a. | (2 points) If *F*(*K,L*) = 100 + 4*K* + 9*L*, what is real GDP if the quantity of capital is 200 and the quantity of labor is 500? |
| b. | (2 points) What is/are the endogenous variable(s) in this model? |
| c. | (2 points) What is/are the exogenous variable(s) in this model? |

**Answer:**

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| a. | *Y* = 100 + 4(200) + 9(500) = 5,400 |
| b. | *Y* |
| c. | *K, L* |

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 | | 200 | |
| Price of good B | 100 | | 200 | |
| Quantity of good B | 100 | | 150 | |

In the exhibit, the citizens of country XYZ come to desire more of the two exhibited goods. As a result, the quantity and price of the two goods rise.

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| 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:**

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| a. | Base-year nominal GDP = 20,000. |
|  | Later-year nominal GDP = 70,000. |
| b. | Real GDP in base year = 20,000. |
|  | Real GDP in later year = 35,000. |
| c. | GDP deflator in later year = 2. |
| d. | Fixed-weight index = 2. |

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

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| a. | (2 points) The federal government purchases a domestically produced computer to use in a courthouse. |
| b. | (2 points) A domestic household purchases a computer produced in a foreign country to use in a home. |

**Answer:**

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| a. | Government spending increases. |
| b. | Consumption spending increases by the price of the computer, but imports also increase by the price of the computer, so that net exports decrease by the price of the computer, and there will be no net change in GDP. |

4. (20 points) Assume that GDP (*Y*) is 6,000. Consumption (*C*) is given by the equation *C* = 600 + 0.6(*Y* – *T*). Investment (*I*) is given by the equation *I* = 2,000 – 100*r*, where *r* is the real rate of interest in percent. Taxes (*T*) are 500 and government spending (*G*) is also 500.

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| a. | (5 points) What are the equilibrium values of *C*, *I* and *r*? |
| b. | (5 points) What are the values of private saving, public saving, and national saving? |
| c. | (5 points) If government spending rises to 1,000, what are the new equilibrium values of *C*, *I* and *r*? |
| d. | (5 points) What are the new equilibrium values of private saving, public saving, and national saving? |

5. (10 points) In the nation of Wiknam, people hold $1,000 of currency and $4,000 of demand deposits in the only bank, Wikbank. The reserve–deposit ratio is 0.25.

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| a. | (5 points) What are the money supply, the monetary base, and the money multiplier? |
| b. | (5 points) Wiknam’s central bank wants to increase the money supply by 10 percent. Should it buy or sell government bonds in open-market operations? Assuming no change in the money multiplier, calculate, in dollars, how much central bank needs to transact. |

**Answer:**

a. The money supply is equal to currency plus demand deposits or $5,000. The monetary base is equal to currency plus reserves. If we assume banks are not holding any excess reserves, then reserves must be 25percent of deposits, or $1,000. In this case the monetary base is equal to $2,000. The money multiplier is equal to the money supply divided by the monetary base, or 2.5. Alternatively, the money multiplier can be calculated using the formula *m = (cr+1)/(cr+rr)*, where *cr* is the currency deposit ratio (0.25) and *rr* is the reserve deposit ratio (0.25).

b. To increase the money supply the central bank should buy government bonds because this will increase reserves in the banking system, allowing loans, deposits, and the money supply to increase. We know that *M=mB*, so *M = m* × *B*. If the central bank wants the money supply to increase by 10 percent then they want the change in the money supply to equal $500. We know the money multiplier is 2.5 so therefore the monetary base must increase by $200, meaning the central bank must buy $200 of government bonds.

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

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| 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) Faster money growth always causes inflation to increase. |

**Answers:**

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.

Fisher equation: MV=PY

If , .

7. (20 points) Consider a small open economy. Suppose that a large number of foreign countries begin to subsidize investment by instituting an investment tax credit (while adjusting other taxes to hold their tax revenue constant), but this small open economy does not institute such an investment subsidy.

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| a. | (4 points) What happens to world investment demand as a function of the world interest rate? |
| b. | (4 points) What happens to the world interest rate? |
| c. | (4 points) What happens to the investment in this small open economy? |
| d. | (4 points) What happens to the trade balance of this small open economy? |
| e. | (4 points) What happens to real exchange rate of this small open economy? |

**Answer:**

a. If the countries that institute an investment tax credit are large enough to shift the world investment demand schedule, then the tax credits shift the world investment demand schedule upward, as in Figure 6-14.



b. The world interest rate increases from *r*\*1 to *r*\*2 because of the increase in world investment demand; this is shown in Figure 6-15. (Remember that the world is a closed economy.)

c. The increase in the world interest rate increases the required rate of return on investments in this small open economy. Because the investment schedule slopes downward, we know that a higher world interest rate means lower investment, as in Figure 6-15.



d. Given that our saving has not changed, the higher world interest rate means that our trade balance increases, as in Figure 6-16.



e. The increase in the world interest rate reduces domestic investment, which increases the supply of dollars that are available to invest abroad. The domestic currency becomes less valuable, and domestic goods become less expensive relative to foreign goods. The real exchange rate falls, as is shown in Figure 6-17.



8. (20 points) Consider an economy with two sectors: manufacturing and services. Demand for labor in manufacturing and services are described by these equations:

where *L* is labor (in number of workers), *W* is the wage (in dollars), and the subscripts denote the sectors. The economy has 100 workers who are willing and able to work in either sector.

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| a. | (5 points) If workers are free to move between sectors, what relationship will there be between and ? |
| b. | (5 points) Suppose that the condition in part (a) holds and wages adjust to equilibrate labor supply and labor demand. Calculate the wage and employment in each sector. |
| c. | (5 points) Suppose a union establishes itself in manufacturing and pushes the manufacturing wage to  $25. Calculate employment in manufacturing. |
| d. | (5 points) In the aftermath of the unionization of manufacturing, all workers who cannot get the highly paid union jobs move to the service sector. Calculate the wage and employment in services. |

**Answers:**

a.

b.

100 =

c.

d.