1. Give a precise, one-sentence definition or description of the following basic concepts.

   a. Opportunity cost  
   b. The real interest rate  
   c. The production possibility frontier for guns and butter  
   d. The market demand curve for water

   **Opportunity cost – the value of the best alternative given up when making a choice.**
   **Real interest rate – the price of borrowing/lending in real terms, adjusted for inflation. The difference between the nominal interest rate and the expected rate of inflation.**
   **PPF – for a fixed amount of resources, the PPF shows the maximum amount of guns that can be produced for given quantities of butter, and vice versa. It will typically reflect increasing marginal costs.**
   **Market demand curve – the relationship between the price of water and amount of water the market is willing to buy; reflects the willingness of the market to pay for water and thus its marginal value.**

2. You must decide whether to spend the next four hours either a) playing golf, or b) watching a movie for two hours then studying economics for two hours. The fee for playing golf at the university course is $25 and a ticket to the movie is $7. You would be willing to pay $50 for a round of golf, $10 to see the movie and $20 to study (since it will help you get an A in the course).

   a. What is your total opportunity cost of playing golf?  
   \[ \text{Total cost of playing golf is } $25 + $10 + $20 = $55. \]

   b. If you are rational, which alternative will you choose, and why?  
   \[ \text{Total cost of alternative (b) is } $7 + $50 = $57. \text{ You will choose the low-cost alternative – playing golf.} \]
3. Suppose that water is sold in a competitive market free from government intervention. Use the model of supply and demand to predict the likely effects of the following on the price of water and the quantity of water sold to users. Use a graph if helpful, and be sure to explain the behavior that underlies the prediction.

a. A large amount of rain falls.
   Since rain is a substitute for buying water from the water companies, the demand for water will fall (shift to the left). At the initial price of water, there will be an excess demand, so the price of water will fall. The lower price will create incentives for producers to sell less water, and therefore the quantity of water purchased from the water company will decrease. Alternatively, if you interpret rain solely as an input into the “production” of water, then the supply of water would shift to the right with the additional rain, lowering the price of water, but increasing total usage.

b. There is an increase in population.
   The demand for water increases, causing the price of water to rise and the quantity sold to rise.

c. The water company uses a new technology that reduces the costs of water delivery.
   The supply of water will increase, causing the price to fall and the quantity sold to rise.

4. Suppose the opportunity cost of producing 50 tons of steel is 50 tons of wheat in the US and 30 tons of wheat in Japan.

a. Which country has a comparative advantage in the production of wheat, and why?
   The cost of one ton of wheat produced in the US is one ton of steel. The cost of one ton of wheat produced in Japan is 5/3 tons of steel. Since the opportunity cost of wheat is lower in the US than in Japan, the US has a comparative advantage in producing wheat.

b. If the US Congress passes a law preventing trade with Japan, would this hurt wheat farmers in the US? If so, give an example using the information above to show how.
   Suppose there is no trade between the US and Japan because of the law. For wheat farmers to buy one ton of steel, they must give up one ton of wheat. However, if trade were allowed, and the US specialized in wheat production, wheat farmers could buy one ton of steel for less than one ton of wheat, say 4/5 of a ton of wheat. Japanese steel producers would be willing to make this trade because without it, they only get 3/5 tons of wheat for each ton of steel they produce.
5. Draw the circular flow model for a hypothetical economy without a government sector. Suppose consumption is $150,000, gross investment is $50,000 and GDP is $210,000. Assign values to all of the money-flow arrows in your picture.

See below.

6. Will the following economic transactions be a part of US GDP in 2002? Why or why not? What spending flows are affected in each case?

   Not part of US GDP in 2002 since the widgets were produced in 2001. Consumption would rise in 2002, but inventory investment would fall.

b. Toyota cars, produced in Michigan in February of 2002, are sold to Canadian households in June of 2002.
   Since the cars are produced within the US and sold abroad, they will be part of US GDP in 2002 as net exports.

c. You get a haircut tomorrow in Athens.
   In GDP as consumption.

7. In his election campaign, your Congressman argues than a decrease in the federal budget deficit will necessarily lead to an increase in investment and will thus increase economic growth. Is he correct, and therefore deserving of your vote? Carefully use what you’ve learned from the circular flow model to support your answer.

He is not deserving of your vote (based on economics anyway). The circular flow implies that gross investment must equal household savings minus the government deficit minus net exports. However, a decrease in the budget deficit might be associated with a decrease in household saving of the same amount, in which case there would be no effect on investment and growth. Therefore, it is certainly not necessary that a reduction in the deficit will lead to more investment.

8. You are a research assistant for an economics professor. She wants you to find out two things about Italy’s economy: a) how fast overall production grew in this economy from 2000 to 2001; and b) the rate of inflation from 2000 to 2001. You quickly discover the following facts: in the year 2000, both nominal and real GDP were 100,000 euros; in the year 2001, nominal GDP was 115,500 euros and real GDP was 105,000 euros. What answers will you report back to the professor?

a) Real GDP grows by 5% over the year \([(105 - 100)/100]\).

b) The GDP deflator in 2001 is 1.1. Therefore, the rate of inflation from 2000 to 2001 is 10%.