Homework #2

This homework is optional. It gives you an extra credit of up to 40 points toward your second midterm exam score. Incomplete - and possibly even incorrect - answers will give you some partial credit. If you choose to do this homework turn it in before the first midterm (Monday, October 7, 1 p.m.).

Suppose you are hired by the government of the Land of Dwarves as an economic advisor. Your task is to analyze the performance of Dwarvian economy. Since Dwarvian statesmen (just like almost all other) have little understanding of macroeconomics, you have to show your work and provide necessary verbal explanations to your calculations. You will not get "paid" if your answers to the questions below are just bare numbers.

Here are the facts you were able to learn during your visit to the Homeland Statistics Agency.
Production. Dwarvian economy consists of five industries: iron-mining, iron-working (smithing), wood-working, arrow-making, and – the last but not the least – emerald industry. In the year 1299, iron-miners extracted 100,000 tons of iron ore and sold it to smiths at 10 guldens per ton. (Gulden is the Dwarvian currency; its symbol is Þ.) Smiths forged 1.5 million arrowheads from this amount of ore and sold them to arrow-makers at Þ1.00 gulden per piece. The latter bought additionally 1.5 million arrow shafts from the wood-makers (this is the total output of the wood-working industry) at Þ0.30 per item and assembled 1.5 million arrows from these two components. Market price of an arrow is Þ1.50. The distribution of the arrows was the following: 600,000 were bought by Dwarvian households (for hunting); 400,000 arrows were procured by the government (for the needs of the army); the rest were exported. Finally, the emerald industry produced 40,000 emeralds and sold them at Þ200.00 per piece (average price).
Foreign trade. Most emeralds are exported. Only 2,000 emeralds were sold in domestic jewelry stores in 1299. Proceeds from foreign trade were used by Dwarves in the following manner: they bought Þ1 million worth of equipment for the emerald industry, Þ25,000 worth of equipment for the other industries, and the rest was used to buy food supplies.
Government finance. Government raises its revenue through a uniform income tax and has no expenditures other than the procurement of arrows. (Government officials of the Land of Dwarves work on the voluntary basis. Your position is the only paid one, but your salary is actually paid by USAID, an American agency providing economic and humanitarian assistance to developing countries.)
Demography. The total population of the land of Dwarves is 4,000. Working heads of households constitute one third of the population. The rest are their dependents: women, children, and the elderly. (Apparently, Dwarvian society is a traditional one.) The rate of population growth is 1% per year, and the share of working Dwarves in the total population remains constant.
Additionally, you've learnt from your colleagues that the Land does not depend totally on the imported food. On the contrary, hunting provides Dwarves with the same amount of food as import. In other words, only one half of the Dwarves' diet is made up of imported food. However, selling game is believed to bring bad luck. So, no one does this. Lucky hunters cook their favorite dragon ribs in toadstool jelly (or whatever the hunt was good for) themselves, at home, and enjoy this delicious meal with their families and occasional guests.

Now the questions:

1) Determine the total output (GDP) of Dwarvian economy. To make sure you make no errors, calculate it in two ways: a) as the total value of final products, and b) as the sum of value added of each industry. (6 points)

2) Calculate the components of GDP. Is this country a net exporter? How large is the share of food expenditure in the total consumption? (6 points)

3) Calculate Dwarvian GDP per capita and labor productivity in 1299. (NOT the rate of growth of labor productivity.) (5 points)

4) Suppose you've learnt that 400 Dwarves live in the Kingdom of Elves. One hundred of them are working heads of households. Each of them make Þ10,000 per year. How does this information affect your calculation of GDP? Any other important measure of Dwarvian economic performance? (4 points)

5) Suppose you've undertaken a survey of Dwarvian businesses and found out that the capital-output ratio in the economy is 1. Your colleagues tell you that in the Land of Dwarves (just as in many other countries) capital contributes one-third and labor two-thirds to output growth. The rate of total factor productivity growth is known to be 1% per year. What is the rate of per capita GDP growth in the Land? What is your estimate of GDP for the year 1300? [Hint: What is the savings rate in this economy?] (7 points)

6) An unforeseen and unfortunate event occurs in the Kingdom of Elves in the early 1300. Severe economic depression in strikes this country. Ensuing political turmoil forces the Dwarves that live there to flee to their homeland. Dwarvian government introduces an additional tax to pay allowances to the newly repatriated Dwarves. What happens to GDP of the Land of Dwarves? GDP per capita? The rate of growth of per capita GDP? [Hint for the last question: What is the rate of population growth for the year 1300?] (6 points)

7) These disturbances cause inflation: by the end of the year 1300 domestic food prices are 10% higher than they were one year before. What is the overall inflation rate in the economy? Answer this question using CPI. [Hint: The cost of a typical "market basket" for the year 1299 is simply the total consumption divided by the number of households or by the total population. In principle, you need to know the prices of all consumer goods in order to calculate CPI. However, it is not necessary in your case because you know the cost of the food part of the market basket in 1299 (=total value of imported food).] (6 points)