1. (20 points) Your task in this problem is to construct national income and product accounts for a world economy that consists of two countries, the United States (U.S.) and Japan. In the U.S., there are two firms, USSteel and USAuto, both owned by U.S. citizens. In Japan, there is one firm, JapanAuto, owned by Japanese citizens. All of the employees of USSteel and USAuto are U.S. citizens and all of the employees of JapanAuto are Japanese citizens.

In a given year, USSteel produces $6000 worth of steel and pays wages of $1500. It sells $2000 worth of steel to USAuto and $4000 worth of steel to JapanAuto.

USAuto produces $8000 worth of cars during the year; it sells $5500 worth of cars to consumers in the U.S., $1500 worth of cars to the U.S. government, and $1000 worth of cars to consumers in Japan.

JapanAuto produces $9500 worth of cars during the year; it sells $5000 worth of cars to consumers in the U.S., $1000 worth of cars to the Japanese government, and $3500 worth of cars to consumers in Japan.

For each of the countries, determine the following quantities: gross domestic product (GDP), gross national product (GNP), consumption, investment, government spending, net exports, and national saving. Explain the logic underlying your calculations.
2. Each of the parts in this question is worth 10 points.

(a) A consumer lives for two time periods (today and tomorrow) and consumes consumption goods in both periods. His income today is $5,000 and his income tomorrow is $10,000. There are no taxes. The consumer can borrow and lend freely at an interest rate of 10%. Suppose that the consumer’s goal is to smooth consumption perfectly across the two time periods (i.e., his goal is to set consumption today equal to consumption tomorrow). How much should the consumer save (or borrow) today?

(b) Now consider a more general situation in which the consumer’s income today is \( Y \), his income tomorrow is \( Y^f \), and the interest rate is \( r \). There are no taxes. Suppose again that the consumer’s goal is to smooth consumption perfectly across the two time periods. Suppose further that in order to smooth consumption perfectly he must borrow today. Show that if \( r \) increases, then the consumer continues to be a borrower. Explain carefully. (Hint: You may use a carefully drawn diagram to support your answer.)

3. (20 points) Suppose that the introduction of debit cards reduces the real demand for money. Use the macroeconomic model that we have developed in this course to determine the effects of this change in money demand on output, the real interest rate, and the price level. Support your answer with a careful argument.

4. (20 points) Suppose that there is a temporary increase in government spending. Should the Federal Reserve Bank increase or decrease the nominal money supply in order to counteract the effects of this increase in government spending on the price level? Explain carefully, using carefully drawn diagrams to support your answer.
5. (20 points) In the theory of investment that we have developed in this course, firms set the expected future marginal product of capital equal to the tax-adjusted user cost of capital, i.e., \((r + d)p_k/(1 - \tau)\), where \(r\) is the real interest rate, \(d\) is the depreciation rate, \(p_k\) is the price of a new capital good, and \(\tau\) is the effective tax rate on capital. Determine the effects of a decrease in the effective tax rate on output, the real interest rate, and the price level. Explain carefully, using carefully drawn diagrams to support your answer. (When answering this question, you may assume that the change in the effective tax rate has no effect either on government spending or on taxes paid by consumers.)