Instructions. Take a moment to read through the entire exam before beginning. Limit your answers to the space provided below each question. Do not write on the back pages of the exam. A separate booklet will be provided for your rough work (no need to hand this in). Write clearly. Label diagrams clearly. Remember to explain, when explanation is called for (do not simply describe). Exam is worth 40 points in total; exam length is 1.5 hours.

1. [10 points] It is sometimes said that monetary exchange dominates barter exchange because barter requires a coincidence of wants, while monetary exchange does not. Explain why this reasoning is incorrect. In particular, explain why a lack of double coincidence of wants is neither necessary nor sufficient to explain the need for monetary exchange. Be sure to define terms.

**Terms:** A lack of double coincidence of wants means the absence of bilateral gains to trade. A lack of double coincidence does not rule out the possibility of multilateral gains to trade, as exemplified by Wicksell’s triangle. I define monetary exchange to be trade involving a swap of goods for an object that circulates widely as a means of payment.

**Necessity:** In the Wicksell triangle, no monetary object is needed for trade to take place. People could simply cooperate, contributing what they have and acquiring what they want. Or, people could exchange Arrow-Debreu securities at auction. In either case, money is not involved and therefore, money is not necessary.

**Sufficiency:** Consider two people, Adam and Betty, endowed with goods at date 1 and date 2. Assume that Adam is impatient. Then there exist bilateral gains to trade (Adam will borrow from Betty). Suppose that Adam lacks commitment. Then unsecured credit is impossible. Suppose further that Adam possesses and asset that only he values. Then Adam could pay Betty with this asset. Betty would accept the asset (even though she does not value it directly) because she knows that Adam will want to repurchase it (when Betty resells the asset, she is in effect getting repaid for her loan). In this manner, a monetary instrument may be necessary to facilitate intertemporal exchange, even though there is no double coincidence problem.

2. [10 points] If the double coincidence “problem” does not explain monetary exchange, then what else may be responsible for the phenomena? Again, make sure to define terms.

There are two things that may be responsible. The first is a lack of commitment. Commitment refers to the willingness/ability to honor promises. If people had commitment, then credit arrangements could be used for intertemporal trade (so that money would be unnecessary). The second is a lack of record-keeping. Even with a lack of commitment, credit arrangements could be supported by the threat of punishment (for debt default) based on an observable credit history. If credit histories are difficult to see (or if they can be falsified easily), then a monetary object could be used as a substitute record-keeping device. Instead of displaying one’s credit history, one displays one’s money—a signal that one has made valuable contributions to society in the past.

3. [20 points] Consider an economy consisting of three agents (A,B,C) and three time periods (1,2,3). Let \( c_j \) denote consumption at date \( j \). Agents have the following preferences:

\[
W_A = c_1 + \beta c_3 \\
W_B = c_2 + \beta c_1 \\
W_C = c_3 + \beta c_2
\]

where \( 0 < \beta < 1 \). Each agent has a nonstorable endowment as follows: \( (y_1^A, y_2^A, y_3^A) = (0, 0, y), (y_1^B, y_2^B, y_3^B) = (y, 0, 0), (y_1^C, y_2^C, y_3^C) = (0, y, 0) \).

(a) Describe the Pareto-optimal allocation such that \( W_A = W_B = W_C \). Compare the welfare level associated the PO allocation with the autarkic payoff.

The Pareto optimal allocation is one in which A gets good \( y_1 \), B gets good \( y_2 \), and C gets good \( y_3 \). The welfare payoff for each agent in this case is \( W = y \). If each person was instead to consume their own good, each welfare payoff is given by \( W = \beta y < y \).