Problem 1. (Total 30 pts) Suppose that you’re a programmer for a vending machine manufacturer. A certain model of vending machine sells sodas for a dollar and only accepts coins. A consumer has \( N \) coins in her pocket. The value of these coins is given by the vector \( C = [C_1 \ C_2 \ \ldots \ C_N] \), where \( C_i \) is the value, in cents, of coin \( i \). The consumer feeds the coins into the vending machine in order, starting with \( i = 1 \). You would like a Matlab program that gives the output

**The first <number> coins are sufficient. Your change is <amount> cents.**

where <number> is the minimum number of coins, counting from coin 1, that adds up to at least a dollar; or gives the output

**Sorry, insufficient funds.**

in the event the consumer has, well, insufficient funds. Use the \texttt{fprintf} command to generate this output. Assume that the vector \( C \) is already defined in your Matlab command window, but that \( N \) is unknown (so you need to determine it).

(a) (10 pts) Draw a flowchart that represents this task (you may assume here that the value of \( N \) is known and can be input to the flowchart).

(b) (10 pts) Write a program called \texttt{coins1.m} that accomplishes this task by using \texttt{for} loops but no \texttt{while} loops.

(c) (10 pts) Write a program called \texttt{coins2.m} that accomplishes the task using \texttt{while} loops, but no \texttt{for} loops.

Problem 2. (Total 20 pts) This is the same problem as above, but now your vending machine accepts bills as well as coins, and instead of selling sodas for a dollar, the machine sells flowers for $10.95 (see your favorite airport for an example of a flower vending machine). Also, your consumer now has a combination of nickels, dimes, quarters, and one-, five- and ten-dollar bills. In this case, the \( N \) items of currency the consumer has are given by the vector \( T = [T_1 \ T_2 \ \ldots \ T_N] \), where \( T_i = 1 \) if item \( i \) is nickel; \( T_i = 2 \) if item \( i \) is a dime; \( T_i = 3 \) if item \( i \) is a quarter; \( T_i = 4 \) if item \( i \) is a $1 bill; \( T_i = 5 \) if item \( i \) is a $5 bill; and \( T_i = 6 \) if item \( i \) is a $10 bill. As before, the consumer feeds the currency into the vending machine in order, starting with \( i = 1 \). Write a Matlab program called \texttt{currency.m} that gives the output

**The first <number> items of currency are sufficient. Your change is <amount> cents.**

where <number> is the minimum number of items of currency, counting from item 1, that adds up to at least $10.95; or gives the output

**Sorry, insufficient funds.**

when appropriate. Assume that the vector \( T \) is already defined in your command window, but that \( N \) is unknown. Your program must use a \texttt{while} loop, but no \texttt{for} loops.