Introduction: This program assignment will give you practice with functions. We suggest that you do following steps:

- Understand the problem and write the specification.
- Design the program by listing the objects, variables and operations.
- Write the program.
- Compile and Test the program and redesign if needed.

Submit your working program as described below. The program should be in a file named ATMSim2.java and contain a single class ATMSim2. This is an “exercise”, so you may consult freely with any of your classmates. As with all programming projects, each pair should work together and submit only one assignment. The assignment will be graded basically pass/fail (pass = 2 points). The graders may award a single point for good efforts that fall short of success or do not use functions (or methods in Java-speak).

The problem: Write a program to control an ATM. As the ATM commands are similar you may want to re-use parts of your program from the previous lab.

Getting ready: Create a new directory called hw4 or assignment4 as a subdirectory of your cs12a directory. For this assignment you will need to use tio package, see the previous assignment for how to set your CLASSPATH.

The specification: Your ATM simulator should identify itself and ask the user for a 4 digit personal identification number (pin). If the pin number is not recognized, an error message will be displayed on the screen. Otherwise, the authenticated user will enter a transaction session where they can repeatedly perform transactions. The pin numbers you must recognize are:

- 1234 for Ana's account, with initial balance $330.
- 5678 for John's account, with initial balance $70.
- 9999 A special pin indicating that the simulator should quit.

In a real ATM, there would be account numbers with the pin numbers and a database would be used to get the customer and balances. After the customer finishes their transaction session (exits), the ATM should again identify itself and ask for a pin.

Transaction sessions work as in your last program ATMSimulator. Recall that the characters recognized as valid inputs in an ATM session are:

1. D - action to be performed is Deposit. After that, the current user will be asked for the amount he/she wants to deposit;
2. W - action to be performed is Withdrawal. After that, the current user will be asked to input the amount he/she wants to withdraw;
3. P - action to be performed is Print the receipt. The receipt (summary of the current transaction session) is printed on the screen;
4. E - action to be performed is *Exit*; the user will exit the current transaction session.

Any other inputs are invalid, so an error message should be printed.

Your program has to keep track of two distinct users: Ana and John. Ana’s pin number is 1234 and John’s pin number is 5678. Also, you know the current balance for each of these users: Ana’s current balance is $330 and John’s current balance is $70. You will need a few variables to keep track of all these values.

At the beginning, the user will be prompted for the identification pin number. After an user successfully autenticates himself, he will be able to perform all the actions described above in the current ATM session. The main purpose of this assignment is to get you used with writing functions in Java. Therefore, you are *required* to have a function (or method) that handles a single ATM session. That function should take a balance (and perhaps name) and conduct the sequence of transactions in that session. The function should return the new balance in the account. Assume that all deposits clear when the user exits the sequence of transactions.

There are several things your program needs to take care of. It should keep track of the current balance of both the users Ana and John. The ATM transaction session (but not necessarily the main program) also needs to keep track of the current balance, the amount deposited and the amount withdrawn by the current user. With each withdrawal made, the corresponding amount will be subtracted from the current balance. All the amounts deposited will be added to the current balance only after the user exits the transaction session. Please note that an amount larger than the current balance cannot be withdrawn. For example, if the current balance is 50 dollars, it should not be possible to withdraw 100 dollars, even if several deposits have been done during the same session (the deposits will be taken into account only after the session is exited). Also note that if a user chooses the Exit option, and after that he/she enters the pin again, the current balance will reflect all the deposits and withdrawals they made in previous ATM sessions.

We expect that you will use Program 3 as a starting point for the function that handles transaction sessions. However, we did not yet have functions then. Students are encouraged to decompose their Program 3 into functions at this time. It is natural to use a different function to process each of the transactions: *Deposit, Withdraw and Print receipt*.

To start open (create) in your favorite editor (pico, emacs, vi etc.) a new file ATMSim2.java. The first lines of your programs should always have the file name and the names and computer accounts of the program authors in comments.

```java
// ATMSim2.java
// Author: Firstname Lastname account
// Author: Firstname Lastname account
// Date:
// lab4 for the class cmps12a ..
// Short description what this program does.
```

Each function should also be preceded by a comment describing its interface and what it does.

**The Submission:** To submit this assignment run the submit command out of your working directory.

`submit cmps012a-dh.w04 hw4 ATMSim2.java`

Submit only your Java source code. Do not submit Java .class files. You can submit multiple times, only last version will be saved and graded. To see your files use:
Grading: This assignment is an exercise and will be graded on a pass/fail basis. If you would like more detailed feedback on your program, please consult with lab tutor for a face-to-face analysis.

Example Run: Feel free to modify the dialog so long as the essential usage and financial information is clearly presented.

> javac ATMSim2.java
> java ATMSim2

This is the ATM simulator, version 2.

Please enter your (4 digit) pin number:
11111

Sorry! 11111 is an invalid pin number!

Please enter your (4 digit) pin number:
2315

Sorry! The pin you entered is not recognized! Please try again!

Please enter your (4 digit) pin number:
5678

Welcome John!

Your current balance is $70.

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
D

Please enter the (integer) amount you want to deposit:
300

You deposited $300.

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
W

Please enter the (integer) amount you want to withdraw:
100

Sorry! There are only $70 in your account.

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
W
Please enter the (integer) amount you want to withdraw: 40

Withdrawing $40 -
$20 $20

Please take your cash!

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)? T

Sorry! The ‘‘T’’ command is not recognized!

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)? P

Balance status as of today:
Previous balance: $70
Deposit: $300
Withdrawals: $40
Current balance: $330 ($30 available for withdrawal)

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)? W

Please enter the (integer) amount you want to withdraw: 100

Sorry! you only have $30 available for withdrawal.

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)? E

Thanks! Have a nice day, John!

Please enter your (4 digit) pin number: 1234

Welcome Ana!

Your current balance is $330.

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)? W
Please enter the (integer) amount you want to withdraw:
10

Sorry! withdrawals must be multiples of $20.

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
W

Please enter the (integer) amount you want to withdraw:
20

Withdrawing $20 -
$20
Please take your cash!

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
P

Balance status as of today:
Previous balance: $330
Deposit: $0
Withdrawals: $20
Current balance: $310 ($310 available for withdrawal)

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
E

Thanks! Have a nice day, Ana!

Please enter your (4 digit) pin number:
5678

Welcome John!

Your current balance is $330.

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
W

Please enter the (integer) amount you want to withdraw:
100

Withdrawing $100 -
$20 $20 $20 $20 $20
Please take your cash!
Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
P
Balance status as of today:
Previous balance: $330
Deposit: $0
Withdrawals: $100
Current balance: $230 ($230 available for withdrawal)

Action ( D : Deposit, W : Withdrawal, P : Print receipt, E : Exit)?
E

Thanks! Have a nice day, John!

Please enter your (4 digit) pin number:
9999

This ATM is now closed.