

Test No.	Use Case	Function Being Tested	Initial System State	Input	Expected Output	Actual Output	Pass/Fail
1.1.1	System Startup	System is started when the switch is turned "on"	System is off	Activate the "on" switch	System requests initial cash amount	System requested initial cash amount	Pass
1.1.2	System Startup	System accepts initial cash amount	System is requesting cash amount	Enter a legitimate amount: Equivalence class: Number ≥ 0 Entered 5	System is on Initial Cash amount is \$100.00	System is on Initial Cash amount is \$100.00	Pass
1.1.3	System Startup	System accepts initial cash amount	System is requesting cash amount	Enter a legitimate amount: Equivalence class: Non-numeric character Entered "F"	System throws NumberFormatException System does not turn on	System throws NumberFormatException System does not turn on	Pass
1.1.4	System Startup	System accepts initial cash amount	System is requesting cash amount	Enter an illegitimate amount: Equivalence class: Number < 0 Entered -100	System does not accept input and requests valid input System does not turn on	System does not accept input and request valid input System does not turn on	Pass
1.1.5	System Startup	Connection to the bank is established	System has just been turned on	Perform a legitimate inquiry transaction: Card: 1 PIN: 42 Attempted Balance Inquiry	System output should demonstrate that a connection has been established to the Bank	Sun Nov 01 15:45:41 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #3 INQUIRY FROM: CHKG TOTAL BAL: \$100.00 AVAILABLE: \$100.00	Pass
1.2.1	System Shutdown	System is shut down when the switch is turned "off"	System is on and not servicing a customer	Activate the "off" switch	System is off	System turns off. Displays "Not currently available"	Pass

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1.2.2	System Shutdown	Connection to the Bank is terminated when the system is shut down	System has just been shut down		Verify from the bank side that a connection to the ATM no longer exists		
2.1.1	Session	System reads a customer's ATM card	System is on and not servicing a customer	Insert a readable card Card: 2	Card is accepted; System asks for entry of PIN	Please enter your PIN Then press ENTER	Pass
2.1.2.	Session	System rejects an unreadable card	System is on and not servicing a customer	Insert an unreadable card Card: -1	Card is ejected; System displays an error screen; System is ready to start a new session	Unable to read card	Pass
2.1.3.	Session	System rejects an unreadable card	System is on and not servicing a customer	Insert an unreadable card Card: Z	Card is ejected; System displays an error screen; System is ready to start a new session	Unable to read card	Pass
2.1.4.	Session	System accepts customer's PIN	System is asking for entry of PIN	Enter a PIN Card: 2 PIN: 1234	System displays a menu of transaction types	Please choose transaction type 1) Withdrawal 2) Deposit 3) Transfer 4) Balance Inquiry	Pass
2.1.5.	Session	System allows customer to perform a transaction	System is displaying menu of transaction types	Perform a transaction: Balance Inquiry	System asks whether customer wants another transaction	Would you like to perform another transaction?	Pass

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2.1.6.	Session	System allows multiple transactions in one session	System is asking whether customer wants another transaction	Answer yes	System displays a menu of transaction types	Please choose transaction type 1) Withdrawal 2) Deposit 3) Transfer 4) Balance Inquiry	Pass
2.1.7.	Session	Session ends when customer chooses not to do another transaction	System is asking whether customer wants another transaction	Answer no	System ejects card and is ready to start a new session	Ejecting card Please insert you card	Pass
	Transaction	Individual types of transaction will be tested below					Pass
3.1.1.	Transaction	System handles an invalid PIN properly	A readable card has been entered	Enter an incorrect PIN and then attempt a transaction PIN: 5555	The Invalid PIN Extension is performed		This test is a general case and is covered by the following tests.
4.1.1.	Withdrawal	System asks customer to choose an account to withdraw from	Menu of transaction types is being displayed	Choose Withdrawal transaction	System displays a menu of account types	Account to withdraw from 1) Checking 2) Savings 3) Money Markets	Pass
4.1.2.	Withdrawal	System asks customer to choose a dollar amount to withdraw	Menu of account types is being displayed	Choose checking account	System displays a menu of possible withdrawal amounts	Amount of cash to withdraw 1) \$20 2) \$40 3) \$60 4) \$100 5) \$200	Pass

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4.1.3.	Withdrawal	System performs a legitimate withdrawal transaction properly	System is displaying the menu of withdrawal amounts	Choose an amount that the system currently has and which is not greater than the account balance Amount: \$20	System dispenses this amount of cash; System prints a correct receipt showing amount and correct updated balance; System records transaction correctly in the log (showing both message to the bank and approval back)	Sun Nov 01 16:43:49 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #1 WITHDRAWAL FROM: CHKG AMOUNT: \$20.00 TOTAL BAL: \$80.00 AVAILABLE: \$80.00	Pass
4.1.4.	Withdrawal	System verifies that it has sufficient cash on hand to fulfill the request	System has been started up with less than the maximum withdrawal amount in cash on hand; System is requesting a withdrawal amount	Choose an amount greater than what the system currently has ATM: \$20 Withdraw: \$40	System displays an appropriate message and asks customer to choose a different amount	Insufficient cash available	Pass

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4.1.5.	Withdrawal	System verifies that customer's balance is sufficient to fulfill the request	System is requesting a withdrawal ammount	Choose an amount that the system currently has but which is greater than the account balance Card: 1 Withdraw: \$200	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Insufficient available balance	Pass
4.1.6.	Withdrawal	A withdrawal transaction can be cancelled by the customer any time prior to choosing the dollar amount	System is displaying menu of account types	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass
4.1.7.	Withdrawal	A withdrawal transaction can be cancelled by the customer any time prior to choosing the dollar amount	System is displaying menu of dollar amounts	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass
5.1.1.	Deposit	System asks customer to choose an account to deposit to	Menu of transaction types is being displayed	Choose Deposit transaction Card: 1	System displays a menu of account types	Account to deposit to 1) Checking 2) Savings 3) Money Market	Pass
5.1.2.	Deposit	System asks customer to enter a dollar amount to deposit	Menu of account types is being displayed	Choose checking account	System displays a request for the customer to type a dollar amount	Amount of deposit 0.00	Pass

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5.1.3.	Deposit	System asks customer to insert an envelope	System is displaying a request for the customer to type a dollar amount	Enter a legitimate dollar amount Amount: 100.00	System requests that customer insert an envelope	Click to insert envelope	Pass
5.1.4.	Deposit	System performs a legitimate deposit transaction properly	System is requesting that customer insert an envelope	Insert an envelope	System accepts envelope; System prints a correct receipt showing amount and correct updated balance; System records transaction correctly in the log (showing message to the bank, approval back, and acceptance of the envelope)	Sun Nov 01 17:49:07 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #9 DEPOSIT TO: CHKG AMOUNT: \$100.00 TOTAL BAL: \$180.00 AVAILABLE: \$80.00 LOG: Message: INIT_DEP CARD# 1 TRANS# 9 NO FROM TO 0 \$100.00 Response: SUCCESS Envelope: received Message: COMP_DEP CARD# 1 TRANS# 9 NO FROM TO 0 \$100.00 Response: SUCCESS	Pass
5.1.5.	Deposit	A deposit transaction can be cancelled by the customer any time prior to inserting an envelope	System is displaying menu of account types	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass

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5.1.6.	Deposit	A deposit transaction can be cancelled by the customer any time prior to inserting an envelope	System is requesting customer to enter a dollar amount	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass
5.1.7.	Deposit	A deposit transaction can be cancelled by the customer any time prior to inserting an envelope	System is requesting customer to insert an envelope	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass
5.1.8.	Deposit	A deposit transaction is cancelled automatically if an envelope is not inserted within a reasonable time	System is requesting customer to insert an envelope	Wait for the request to time out	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	After 25 seconds: Last transaction was cancelled Would you like to do another transaction?	Pass
6.1.1.	Transfer	System asks customer to choose an account to transfer from	Menu of transaction types is being displayed	Choose Transfer transaction	System displays a menu of account types specifying transfer from	Account to transfer from 1) Checking 2) Savings 3) Money Market	Pass

Test No.	Use Case	Function Being Tested	Initial System State	Input	Expected Output	Actual Output	Pass/Fail
6.1.2.	Transfer	System asks customer to choose an account to transfer to	Menu of account types to transfer from is being displayed	Choose checking account	System displays a menu of account types specifying transfer to	Account to transfer To 1) Checking 2) Savings 3) Money Market	Pass
6.1.3.	Transfer	System asks customer to enter a dollar amount to transfer	Menu of account types to transfer to is being displayed	Choose savings account	System displays a request for the customer to type a dollar amount	Amount to transfer 0.00	Pass
6.1.4.	Transfer	System performs a legitimate transfer transaction properly	System is displaying a request for the customer to type a dollar amount	Enter a legitimate dollar amount Amount: \$10.00	System prints a correct receipt showing amount and correct updated balance; System records transaction correctly in the log (showing both message to the bank and approval back)	Sun Nov 01 18:57:09 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #16 TRANSFER FROM: CHKG TO: SVGS AMOUNT: \$10.00 TOTAL BAL: \$1010.00 AVAILABLE: \$1010.00	Pass
6.1.5.	Transfer	A transfer transaction can be cancelled by the customer any time prior to entering dollar amount	System is displaying menu of account types specifying transfer from	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass

Test No.	Use Case	Function Being Tested	Initial System State	Input	Expected Output	Actual Output	Pass/Fail
6.1.6.	Transfer	A transfer transaction can be cancelled by the customer any time prior to entering dollar amount	System is displaying menu of account types specifying transfer to	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass
6.1.7.	Transfer	A transfer transaction can be cancelled by the customer any time prior to entering dollar amount	System is requesting customer to enter a dollar amount	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass
7.1.1.	Inquiry	System asks customer to choose an account to inquire about	Menu of transaction types is being displayed	Choose Inquiry transaction	System displays a menu of account types	Account to inquire from 1) Checking 2) Savings 3) Money Market	Pass
7.1.2.	Inquiry	System performs a legitimate inquiry transaction properly	System is displaying menu of account types	Choose checking account	System prints a correct receipt showing correct balance; System records transaction correctly in the log (showing both message to the bank and approval back)	Sun Nov 01 19:04:39 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #20 INQUIRY FROM: CHKG TOTAL BAL: \$170.00 AVAILABLE: \$70.00	Pass

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7.1.3.	Inquiry	An inquiry transaction can be cancelled by the customer any time prior to choosing an account	System is displaying menu of account types	Press "Cancel" key	System displays an appropriate message and offers customer the option of choosing to do another transaction or not.	Last transaction was cancelled Would you like to do another transaction?	Pass
8.1.1.	Invalid PIN Extension	Customer is asked to reenter PIN		Enter an incorrect PIN; Attempt an inquiry transaction on the customer's checking account	Customer is asked to re-enter PIN	PIN was incorrect Please re-enter your PIN Then press ENTER	Pass
8.1.2.	Invalid PIN Extension	Correct re-entry of PIN is accepted	Request to re-enter PIN is being displayed	Enter correct PIN	Original transaction completes successfully	Sun Nov 01 19:16:17 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #23 INQUIRY FROM: CHKG TOTAL BAL: \$150.00 AVAILABLE: \$50.00	Pass
8.1.3.	Invalid PIN Extension	A correctly re-entered PIN is used for subsequent transactions	An incorrect PIN has been re-entered and transaction completed normally	Perform another transaction	This transaction completes successfully as well	Sun Nov 01 19:23:52 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #24 INQUIRY FROM: CHKG TOTAL BAL: \$150.00 AVAILABLE: \$50.00	Pass

Test No.	Use Case	Function Being Tested	Initial System State	Input	Expected Output	Actual Output	Pass/Fail
8.1.4.	Invalid PIN Extension	Incorrect re-entry of PIN is not accepted	Request to re-enter PIN is being displayed	Enter incorrect PIN	An appropriate message is displayed and re-entry of the PIN is again requested	PIN was incorrect Please re-enter your PIN Then press ENTER	Pass
8.1.5.	Invalid PIN Extension	Correct re-entry of PIN on the second try is accepted	Request to re-enter PIN is being displayed	Enter incorrect PIN the first time, then correct PIN the second time	Original transaction completes successfully	Sun Nov 01 19:27:35 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #25 INQUIRY FROM: CHKG TOTAL BAL: \$150.00 AVAILABLE: \$50.00	Pass
8.1.6.	Invalid PIN Extension	Correct re-entry of PIN on the third try is accepted	Request to re-enter PIN is being displayed	Enter incorrect PIN the first time and second times, then correct PIN the third time	Original transaction completes successfully	Sun Nov 01 19:35:27 EST 2015 First National Bank of Podunk ATM #42 Gordon College CARD 1 TRANS #25 INQUIRY FROM: CHKG TOTAL BAL: \$150.00 AVAILABLE: \$50.00	Pass
8.1.7.	Invalid PIN Extension	Three incorrect re-entries of PIN result in retaining card and aborting transaction	Request to re-enter PIN is being displayed	Enter incorrect PIN three times	An appropriate message is displayed; Card is retained by machine; Session is terminated	Your card has been retained. Please contact the bank.	Pass

Pass Rate: 100%

Commentary:

The code coverage as generated by Emma shows that the tests cover only 90% of the code. Some of the code not covered includes different places where the customer could have hit cancel. Not all of these possibilities were covered. Some unused functions such as that return cents or serial numbers are not used.

Since input is being automated, the portions of code that use the wait() function to wait for a listener to be notified are skipped as well. A lot of the code in SimKeyboard that listens for key presses on the keypad are skipped. The same is true for the ON and OFF button listeners. And of course none of ATMApplet or ATMMain are exercised.

To increase the code coverage, the API would have to be updated to use functions that notify the listeners. More automated tests of the user cancelling would help exercise more of the code in Sessions.java.