

A4

Bug 1: Incorrect Calculation of Fines

Use Case

As a borrower, I should be able to pay my overdue fine at \$1.00 per day overdue so that I can make further loans.

Replication

```
Choice: :
n
Return Item Use Case UI

Scan Item (<enter> completes): 1
Inspecting
Item: 1
--Type: --Book
--Title: --doe
--Author: --jane
--CallNo: 1
--State: --ON_LOAN
Loan: --1
--Borrower 1: --john doe
--Item 1: --Book
doe
--DueDate: --07/10/2022
--State: OVER_DUE
--Fines: $1.00

Overdue fine: $1.00
Is item damaged? (Y/N): n

Overdue fine: $1.00

Total fines: $1.00
Return processing complete
```

```
Choice:
lp

Patron: 1
  Name: john doe
  Email: john@example.com
  Phone: 1234
  Fines Owed: $3.00
```

Test Script

Description

A fee of \$1.00 is calculated on a loan that is one day overdue.

Outcomes

- Loan is discharged
- Overdue fee of \$1.00 is calculated

Setup

- Create a patron
- Create an item
- Create a loan against item for patron
- Increment date by 3 days

Steps

#	Action	Expected Result	Pass/Fail
1	R: Return undamaged loan	Loan is returned	P
2	LP: List patrons	Fines owed is \$1	p

Execution

Date	Tester	ID	Status
5/10/2022	EM	1	Failed
5/10/2022	EM	1	Passed

Loan is created:

```
Commit loans? (Y/N): Completed Loan Slip
Loan: 1
  Borrower 1: john doe
  Item 1: Book
doe
  DueDate: 07/10/2022
  State: CURRENT
  Fines: $0.00
Press <any key> to complete
Borrowing Completed
```

Loan is returned after 3 days:

```
Inspecting
Item: 1
  Type: Book
  Title: doe
  Author: jane
  CallNo: 1
  State: ON_LOAN
Loan: 1
  Borrower 1: john doe
  Item 1: Book
doe
  DueDate: 07/10/2022
  State: OVER_DUE
  Fines: $1.00
```

Fine is correctly calculated on patron list:

```
Patron: 1
  Name: john doe
  Email: john@example.com
  Phone: 1234
  Fines Owed : $1.00
```

Bug Log

Simplification

- H0: Bug is introduced immediately after loan is returned
- T0: List patrons after loan is returned
- R0: Fee is incorrectly calculated against patron

Isolation

- H1: Bug is introduced in ``ReturnItemControl.dischargeLoan``
- T1: Print ``currentLoan.getPatron()`` at the start and end of function
- R1: Patron at the start is sane, patron at the end is infected

Resolution

- H2: ``ReturnItemControl.dischargeLoan`` calls ``incurFine`` twice
- T2: Remove ``incurFine`` on line 91 in ``ReturnItemControl``
- R2: Fine amount is reduced but still incorrect
- H3: ``library.dischargeLoan`` calls ``currentLoan.discharge``, which calls ``Patron.dischargeLoan``, which increases ``Patron.finesOwing``
- T3: Remove ``finesOwing`` increment from ``Patron.dischargeLoan``
- R3: Fine is correctly calculated

```
BRLS - Patron.java
src | library | entities | Patron | dischargeLoan
Patron.java x
12 if (!currentLoans.containsKey(loan.getId())) {
11     currentLoans.put(loan.getId(), loan);
10 }
9 else {
8     throw new RuntimeException("Duplicate loan added to member");
7 }
6 }
5
4
3
2
1
82 finesOwing += loan.getFines();
1 currentLoans.remove(loanId);
2 }
3 else {
4     throw new RuntimeException("No such loan held by member");
5 }
6 }
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12 public String getLastName() { return lastName; }
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```

Bug 2: Loan Limit Not Enforced

Use Case

As a borrower, I should not be able to borrow past the loan limit of two.

Replication

```
Choice :  
b  
Borrow Item Use Case UI  
  
Swipe patron card (press <enter> to cancel): 1  
Scan Item (<enter> completes): 1  
Item: 1  
  Type: Book  
  Title: doe  
  Author: jane  
  CallNo: 1  
  State: AVAILABLE  
Scan Item (<enter> completes): 2  
Item: 1  
  Type: Book  
  Title: doe  
  Author: jane  
  CallNo: 1  
  State: AVAILABLE  
Item: 2  
  Type: Book  
  Title: dawson  
  Author: jill  
  CallNo: 2  
  State: AVAILABLE  
Scan Item (<enter> completes): 3
```

```
Completed Loan Slip
Loan: 1
  Borrower 1: john doe
  Item 1: Book
doe
  DueDate: 08/10/2022
  State: CURRENT
  Fines: $0.00
Loan: 2
  Borrower 1: john doe
  Item 2: Book
dawson
  DueDate: 08/10/2022
  State: CURRENT
  Fines: $0.00
Loan: 3
  Borrower 1: john doe
  Item 3: Book
davidson
  DueDate: 08/10/2022
  State: CURRENT
  Fines: $0.00
Press <any key> to complete
Borrowing Completed
```

Test Script

Description

Loan limit is detected immediately, further items cannot be borrowed.

Outcomes

- Loan limit is reached
- Cannot borrow further items

Setup

- Create a patron
- Create 5 items

Steps

#	Action	Expected Result	Pass/Fail
---	--------	-----------------	-----------

1	B: Borrow 2 items	Loan limit reached, commit loan	P
2	B: Borrow	Loan limit reached	p

Execution

Date	Tester	ID	Status
6/10/2022	EM	1	Failed
6/10/2022	EM	1	Passed

Borrow is finished after loan limit is reached:

```
Final Borrowing List
Item: 1
  Type: Book
  Title: doe
  Author: jane
  CallNo: 1
  State: AVAILABLE
Item: 2
  Type: Book
  Title: dawson
  Author: jill
  CallNo: 2
  State: AVAILABLE
Commit loans? (Y/N):
```

Cannot make any additional loans:

```
Borrow Item Use Case UI

Swipe patron card (press <enter> to cancel): 1
Patron cannot borrow at this time
Press <any key> to cancel
```

Bug Log

Simplification

- H0: Limit is incorrectly calculated after a book is scanned
- T0: Print `library.getNumberOfLoansRemainingForPatron` at start and end of `BorrowItemControl.itemScanned`

- R0: Value is sane
- H1: `BorrowItemControl.itemScanned` limit condition is incorrectly skipped
- T1: Set breakpoint on line 80 on `BorrowItemControl.itemScanned`
- R1: Condition is skipped

Isolation

- H2: `BorrowItemControl.itemScanned` limit condition becomes zero
- T2: Print value of `getNumberOfLoansRemainingForPatron` minus `pendingList.size` on line 79
- R2: Result is zero

Resolution

- H3: Update loan limit condition to check for zero
- T3: Update ``< 0`` to ``<= 0``
- R3: Condition is entered and borrowing is set to complete

The screenshot shows an IDE window titled "BRLS - BorrowItemControl.java". The code is for the `itemScanned` method. A breakpoint is set at line 79, which is the condition of an if-statement: `if (library.getNumberOfLoansRemainingForPatron(patron) - pendingList.size() < 0) {`. The code includes logic for handling item availability, adding items to a pending list, and checking the loan limit. The status bar at the bottom indicates "79:12 (85 chars, 1 line break) CRLF UTF-8 Tab* | main".

```

18 public void itemScanned(int itemId) {
19     item = null;
20     if (!state.equals(ControlState.SCANNING)) {
21         throw new RuntimeException("BorrowItemControl: cannot call itemScanned except in SCANNING state");
22     }
23     item = library.getItem(itemId);
24     if (item == null) {
25         ui.display(object: "Invalid itemId");
26         return;
27     }
28     if (!item.isAvailable()) {
29         ui.display(object: "Item cannot be borrowed");
30         return;
31     }
32     pendingList.add(item);
33     for (Item item : pendingList) {
34         ui.display(item);
35     }
36 }
37
38 79 if (library.getNumberOfLoansRemainingForPatron(patron) - pendingList.size() < 0) {
39     ui.display(object: "Loan limit reached");
40     borrowingCompleted();
41 }
42
43 3 usages 1 Elliot Mitchum
44
45 public void borrowingCompleted() {
46     if (pendingList.size() == 0)
47         cancel();
48
49     else {
50         ui.display(object: "\nFinal Borrowing List");
51         for (Item item : pendingList) {
52             ui.display(item);
53         }
54         completedList = new ArrayList<Loan>();
55         ui.setFinalising();
56     }
57 }

```