Reem Ezeddin
IT814 - Fall 2022
Mini project 1

# Functional Testing Project Organization

## Problem 1: Triangle Problem

### 1. Boundary value testing

- Normal worst case boundary value testing has been applied with total of 125 test cases. The results show that the programme failed in 37 test cases. To calculate the efforts per failure we can have the total effort (which is 120 minutes to generate the test cases + 5 minutes to run the test) divided by the number of founded failures (which is 37) so the effort per failure is about 3.4 minutes per failure.
- We can see that the failures are all about two reasons:

  **First**: all test cases that have c >= a + b gave wrong output. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 1,1,100 | Not a Triangle | Isosceles | Fail |
| 1,1,199 | Not a Triangle | Isosceles | Fail |
| 2,2,200 | Not a Triangle | Isosceles | Fail |

All test cases that has b < a + c or a < b + c have been passed.

**Second**: some testing data that have b = c, gave wrong output. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 200,199,199 | Isosceles | Scalene | Fail |
| 199,100,100 | Isosceles | Scalene | Fail |
| 100,200,200 | Isosceles | Scalene | Fail |

Some of the testing data that have b = c with other specifications passed the testing. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 2,2,2 | Equilateral | Equilateral | Pass |
| 200,100,100 | Not a Triangle | Not a Triangle | Pass |

- From the results observation we can tell that some changes have to be gone on the code in the next corrective maintenance phase. The first one is about adding the point of C has to be less than the sum of b and a. Another change need to be done which is adding the condition of isosceles triangles (if b == c && a != b then “Isosceles”.
- The main benefit that has been added by this method is testing the extremes of the variables. It still has not tested the invalid values so we can put the Robust worst case boundary value testing as a testing improvement plan.

## 2. Equivalent class testing:

- Normal equivalent class testing has been applied with total of 11 test cases. The results show that the programme failed in 4 test cases. To calculate the efforts per failure we can have the total effort (which is 30 minutes to generate the test cases + 2 minutes to run the test) divided by the number of founded failures (which is 4) so the effort per failure is about 8 minutes per failure. According to type of equivalent class testing we can see that we have some redundant test cases because we are having more than one test case in the same class. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 8,3,4 | Not a Triangle | Not a Triangle | pass |
| 7,3,4 | Not a Triangle | Not a Triangle | pass |

  There are only 4 mandatory test cases related to 4 classes, so we have 7 extra test cases.

- We can see that the failures are all about three reasons:

  **First**: all test cases that have c >= a + b gave wrong output. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 3,4,8 | Not a Triangle | Isosceles | Fail |
| 3,4,7 | Not a Triangle | Isosceles | Fail |

  All test cases that has b >= a + c or a >= b + c have been passed.

  **Second**: some testing data that have b = c, gave wrong output. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 3,5,5 | Isosceles | Scalene | Fail |

  Some of the testing data that have b = c with other specifications passed the testing. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 5,5,5 | Equilateral | Equilateral | Pass |

  **Third**: a special case that is out of the specification. The code should not focus on the type of the triangle based in its angle.

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 3,4,5 | Scalene | Right Triangle | Fail |

- From the results observation we can tell that some changes have to be gone on the code in the next corrective maintenance phase. The first one is about adding the point of C has to be less than the sum of b and a. Another change need to be done which is adding the condition of isosceles triangles (if b == c && a != b then “Isosceles”. Also we need to check if the right triangle case is mentioned clearly in the specifications or not. if not, the third error need to be fixed.
- The main benefit that has been added by this method is reducing the time of testing and minimize the number of test cases while producing good results.

## 3. Decision table-based testing:

- Normal decision table-based testing has been applied with total of 11 test cases. The results show that the programme failed in 4 test cases. To calculate the efforts per failure we can have the total effort (which is 30 minutes to generate the test cases + 2 minutes to run the test) divided by the number of founded failures (which is 4) so the effort per failure is about 8 minutes per failure.
- We can see that the failures are all about three reasons:

  **First**: all test cases that have c >= a + b gave wrong output. For example:

  | Testing data | Expected output | Actual output | Result |
  |---|---|---|---|
  | 1,2,4 | Not a Triangle | Isosceles | Fail |

  All test cases that has b >= a + c or a >= b + c have been passed.

  **Second**: some testing data that have b = c, gave wrong output. For example:

  | Testing data | Expected output | Actual output | Result |
  |---|---|---|---|
  | 3,2,2 | Isosceles | Scalene | Fail |

  Some of the testing data that have b = c with other specifications passed the testing. For example:

  | Testing data | Expected output | Actual output | Result |
  |---|---|---|---|
  | 5,5,5 | Equilateral | Equilateral | Pass |

  **Third**: a special case that is out of the specification. The code should not focus on the type of the triangle based in its angle.

  | Testing data | Expected output | Actual output | Result |
  |---|---|---|---|
  | 3,4,5 | Scalene | Right Triangle | Fail |

- From the results observation we can tell that some changes have to be gone on the code in the next corrective maintenance phase. The first one is about adding the point of C has to be less than the sum of b and a. Another change need to be done which is adding the condition of isosceles triangles (if b == c && a != b then “Isosceles”. Also we need to check if the right triangle case is mentioned clearly in the specifications or not. if not, the third error need to be fixed.
- The main benefit that has been added by this method providing good coverage and its representation is simple.

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

# Problem 2: Next-Date Problem

## 1. Boundary value testing

- Normal worst case boundary value testing has been applied with total of 124 test cases. The results show that the programme failed in 27 test cases. To calculate the efforts per failure we can have the total effort (which is 120 minutes to generate the test cases + 2 minutes to run the test) divided by the number of founded failures (which is 27) so the effort per failure is about 4.5 minutes per failure.
- We can see that the failures are all about four reasons:

  **First**: all test cases that have days in Feb > 29 gave wrong output. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| "February",30,1812 | Impossible | March 1, 1812 | Fail |
| "February",31,1813 | Impossible | March 1, 1813 | Fail |

  **Second**: All testing data that have days in Jun > 30 and days in Nov > 30 gave wrong output. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| “June",31,2011 | Impossible | July 1, 2011 | Fail |
| "November",31,1912 | Impossible | December 1, 1912 | Fail |

  **Third**: After Dec 31, the system is not incrementing the year. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| “December",31,1912 | January 1, 1913 | January 1, 1912 | Fail |

  **Fourth**: There are 2 faulty test cases:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| "June",1,1812 | June 1, 1812 | June 2, 1812 | Fail |
| "June",1,1813 | June 1, 1813 | June 2, 1812 | Fail |

- From the results observation we can tell that some changes have to be gone on the code in the next corrective maintenance phase. The first one is about adding the point of days in February has to be less than 30, and the boundary value testing should focus on the values of days in February == 29 and the days in February == 28 in the next regression testing. Another important we need to focus on while editing is focusing on the months that have only 30 days. Also, the year need to be incremented after Dec 31. The test cases in the next testing phase should be more accurate and complete all boundary values. In the provided testing data sheet, we can note that one test case is missing (which is “"January",15,1812"). So added it in a separate sheet and fortunately it has been passed.

- The main benefit that has been added by this method is testing the extremes of the variables. It still has not focused on the invalid values so we can put the Robust worst case boundary value testing as a testing improvement plan.

## 2. Equivalent class testing:

- Strong normal equivalent class testing has been applied with total of 22 test cases. The results show that the programme failed in 8 test cases. To calculate the efforts per failure we can have the total effort (which is 45 minutes to generate the test cases + 2 minutes to run the test) divided by the number of founded failures (which is 8) so the effort per failure is about 5.7 minutes per failure. According to type of equivalent class testing we can see that we have some redundant test cases in the sheet provided and some missing test cases, so we are having more than one test case in the same class. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| April,15,1993 | April 16, 1993 | April 16, 1993 | Fail! |
| April,28,1993 | April 29, 1993 | April 29, 1993 | Fail! |

There are also many missing test cases, like the ones related to the class of Year = 2000, and the ones related to the class of a leap year (has been mentioned once with Feb).

- We can see that the failures are all about 5 reasons:

**First**: all test cases that have days in Feb > 29 gave wrong output. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| February,30,1993 | Impossible | March 1, 1993 | Fail |
| February,31,1993 | Impossible | March 1, 1993 | Fail |

**Second**: Testing data that has day in April > 30 gave wrong output:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| April,31,1993 | Impossible | May 1, 1993 | Fail |

**Third**: After Dec 31, the system is not incrementing the year:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| December,31,1993 | January 1, 1994 | January 1, 1993 | Fail |

**Fourth**: There are 3 faulty test cases, where the actual output is identical to the expected output but the system considers that as a Fail:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| April,15,1993 | April,16,1993 | April,16,1993 | Fail |
| April,28,1993 | April,29,1993 | April,29,1993 | Fail |
| April,29,1993 | April,30,1993 | April,30,1993 | Fail |

**Fifth**: when February with a non-leap year and day = 29, the system is not showing that it is impossible:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| February,29,1993 | Impossible | March 1, 1993 | Fail |

- From the results observation we can tell that some changes have to be gone on the code in the next corrective maintenance phase. The first one is about adding the point of days in February has to be less than 30, and the testing should focus on the values of days in February = 29 and the days in February = 28 in the next regression testing. Another important we need to focus on while editing is focusing on the months that have only 30 days. Also, the year need to be incremented after Dec 31. The test cases in the next testing phase should be more accurate and cover all classes.
- The main benefit that has been added by this method is reducing the time of testing and minimize the number of test cases while producing good results.

## 3. Decision table-based testing:

- Normal decision table-based testing has been applied with total of 22 test cases. The results show that the programme failed in 5 test cases. To calculate the efforts per failure we can have the total effort (which is 30 minutes to generate the test cases + 2 minutes to run the test) divided by the number of founded failures (which is 5) so the effort per failure is about 6.4 minutes per failure.
  There are also many missing test cases, like the ones related to the class of Year = 2000, and the ones related to the class of a leap year (has been mentioned once with Feb).

- We can see that the failures are all about 4 reasons:

  **First**: all test cases that have days in Feb > 29 gave wrong output. For example:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| February,30,1993 | Impossible | March 1, 1993 | Fail |
| February,31,1993 | Impossible | March 1, 1993 | Fail |

**Second**: Testing data that has day in April > 30 gave wrong output:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| April,31,1993 | Impossible | May 1, 1993 | Fail |

**Third**: After Dec 31, the system is not incrementing the year:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| December,31,1993 | January 1, 1994 | January 1, 1993 | Fail |

**Fourth**: when February with a non-leap year and day = 29, the system is not showing that it is impossible:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| February,29,1993 | Impossible | March 1, 1993 | Fail |

- From the results observation we can tell that some changes have to be gone on the code in the next corrective maintenance phase. The first one is about adding the point of days in February has to be less than 30, and the testing should focus on the values of days in February = 29 and the days in February = 28 in the next regression testing. Another important we need to focus on while editing is focusing on the months that have only 30 days. Also, the year need to be incremented after Dec 31. The test cases in the next testing phase should be more accurate and cover all classes.
- The main benefit that has been added by this method providing good coverage and its representation is simple.

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

# Problem 3: Commission Problem

## 1. Boundary value testing

- Normal worst case boundary value testing has been applied with total of 40 test cases. The results show that the programme failed in 30 test cases. To calculate the efforts per failure we can have the total effort (which is 50 minutes to generate the test cases + 2 minutes to run the test) divided by the number of founded failures (which is 30) so the effort per failure is about 1.7 minutes per failure.
  Regarding to the type of testing we have, there are 27 mandatory test cases, but we are also having some robust test cases:

| Testing data | Expected output | Actual output | Result |
|---|---|---|---|
| 71,40,45 | 964 | 1084 | Fail |
| 35,81,45 | 886 | 1006 | Fail |
| 35,40,91 | 870 | 990 | Fail |
| 35,40,0 | 415 | 535 | Fail |
| 35,0,45 | 400 | 520 | Fail |
| 0,40,45 | 325 | 445 | Fail |

- We can see that the failures are many categories:

  **First**: Some test cases that have Sales close to 1000 gave wrong output. For example:

| Testing data | Sales | Expected output | Actual output | Result |
|---|---|---|---|---|
| 10,11,9 | 1005 | 100.75 | 100.5 | Fail |
| 1,1,38 | 1025 | 103.75 | 102.5 | Fail |

**Second**: All testing data that have sales > 1800 and gave wrong output. For example:

| Testing data | Sales | Expected output | Actual output | Result |
|---|---|---|---|---|
| 1,1,70 | 1825 | 225 | 345 | Fail |
| 35,40,89 | 5000 | 860 | 980 | Fail |

**Third**: There are some faulty test cases, For example:

| Testing data | Sales | Expected output | Actual output | Result |
|---|---|---|---|---|
| 10,9,11 | 995 | 99.52 | 99.5 | Fail |
| 1,31,1 | 1000 | 10 | 100 | Fail |

- From the results observation we can tell that some changes have to be done on the code in the next corrective maintenance phase. The first one is about checking the algorithm of calculating the commission in the case of the sales are more than 1800. Also, the algorithm in case of the sales is around 1000. Moreover, the test cases need to be more accurate while we are doing the regressing testing.

- The main benefit that has been added by this method providing good coverage and its representation is simple, but it was not enough to catch all the problems.

## 2. Equivalent class testing:

- Normal equivalent class testing has been applied with total of 3 test cases. The results show that the programme failed in 1 test cases. To calculate the efforts per failure we can have the total effort (which is 15 minutes to generate the test cases + 1 minutes to run the test) divided by the number of founded failures (which is 1) so the effort per failure is about 16 minutes per failure.

- We can see that the failure is related to the case of sales > 1800.
- From the results observation we can tell that there is a problem in the algorithm of calculating the commission when the sale is more than 1800.
- The main benefit that has been added by this method is testing the extremes of the variables. We can improve the testing plan by adding the test cases that have the combination of the invalid values.

## 3. Decision table-based testing:

- A decision table based class testing has been applied with total of 7 test cases. The results show that the programme failed in 7 test cases. To calculate the efforts per failure we can have the total effort (which is 20 minutes to generate the test cases + 2 minutes to run the test) divided by the number of founded failures (which is 7) so the effort per failure is about 3.14 minutes per failure.
- The test cases were focusing on the invalid values without taking the Cartesian product of them. Only one of the test cases had all valid values and it was testing the case of sales is more than 1800.
- I cannot tell what is the benefit that has been added by this methodology because it need to cover more test cases that are more accurate.

At the end of this report, I need to mention that it is very difficult to guess the reason of the faults related to the commission problem without having access to the code. In this case, white box testing will be very helpful.

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

# Appendix:

**Complete Test Sets and results:**

## Problem 1: Triangle Problem

1. **Boundary value testing**
   **Testing Data:**

| A | B | C | Expected Output |
|---|---|---|---|
| 1 | 1 | 1 | Equilateral |
| 1 | 1 | 2 | Not a Triangle |
| 1 | 1 | 100 | Not a Triangle |
| 1 | 1 | 199 | Not a Triangle |
| 1 | 1 | 200 | Not a Triangle |
| 1 | 2 | 1 | Not a Triangle |
| 1 | 2 | 2 | Isosceles |
| 1 | 2 | 100 | Not a Triangle |
| 1 | 2 | 199 | Not a Triangle |
| 1 | 2 | 200 | Not a Triangle |
| 1 | 100 | 1 | Not a Triangle |
| 1 | 100 | 2 | Not a Triangle |
| 1 | 100 | 100 | Isosceles |
| 1 | 100 | 199 | Not a Triangle |
| 1 | 100 | 200 | Not a Triangle |
| 1 | 199 | 1 | Not a Triangle |
| 1 | 199 | 2 | Not a Triangle |
| 1 | 199 | 100 | Not a Triangle |
| 1 | 199 | 199 | Isosceles |
| 1 | 199 | 200 | Not a Triangle |
| 1 | 200 | 1 | Not a Triangle |
| 1 | 200 | 2 | Not a Triangle |
| 1 | 200 | 100 | Not a Triangle |
| 1 | 200 | 199 | Not a Triangle |
| 1 | 200 | 200 | Isosceles |
| 2 | 1 | 1 | Not a Triangle |
| 2 | 1 | 2 | Isosceles |
| 2 | 1 | 100 | Not a Triangle |
| 2 | 1 | 199 | Not a Triangle |
| 2 | 1 | 200 | Not a Triangle |
| 2 | 2 | 1 | Isosceles |
| 2 | 2 | 2 | Equilateral |
| 2 | 2 | 100 | Not a Triangle |
| 2 | 2 | 199 | Not a Triangle |
| 2 | 2 | 200 | Not a Triangle |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | |
|---|---|---|---|
| 2 | 100 | 1 | Not a Triangle |
| 2 | 100 | 2 | Not a Triangle |
| 2 | 100 | 100 | Isosceles |
| 2 | 100 | 199 | Not a Triangle |
| 2 | 100 | 200 | Not a Triangle |
| 2 | 199 | 1 | Not a Triangle |
| 2 | 199 | 2 | Not a Triangle |
| 2 | 199 | 100 | Not a Triangle |
| 2 | 199 | 199 | Isosceles |
| 2 | 199 | 200 | Scalene |
| 2 | 200 | 1 | Not a Triangle |
| 2 | 200 | 2 | Not a Triangle |
| 2 | 200 | 100 | Not a Triangle |
| 2 | 200 | 199 | Scalene |
| 2 | 200 | 200 | Isosceles |
| 100 | 1 | 1 | Not a Triangle |
| 100 | 1 | 2 | Not a Triangle |
| 100 | 1 | 100 | Isosceles |
| 100 | 1 | 199 | Not a Triangle |
| 100 | 1 | 200 | Not a Triangle |
| 100 | 2 | 1 | Not a Triangle |
| 100 | 2 | 2 | Not a Triangle |
| 100 | 2 | 100 | Isosceles |
| 100 | 2 | 199 | Not a Triangle |
| 100 | 2 | 200 | Not a Triangle |
| 100 | 100 | 1 | Isosceles |
| 100 | 100 | 2 | Isosceles |
| 100 | 100 | 100 | Equilateral |
| 100 | 100 | 199 | Isosceles |
| 100 | 100 | 200 | Not a Triangle |
| 100 | 199 | 1 | Not a Triangle |
| 100 | 199 | 2 | Not a Triangle |
| 100 | 199 | 100 | Isosceles |
| 100 | 199 | 199 | Isosceles |
| 100 | 199 | 200 | Scalene |
| 100 | 200 | 1 | Not a Triangle |
| 100 | 200 | 2 | Not a Triangle |
| 100 | 200 | 100 | Not a Triangle |
| 100 | 200 | 199 | Scalene |
| 100 | 200 | 200 | Isosceles |
| 199 | 1 | 1 | Not a Triangle |
| 199 | 1 | 2 | Not a Triangle |
| 199 | 1 | 100 | Not a Triangle |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | |
|---|---|---|---|
| 199 | 1 | 199 | Scalene |
| 199 | 1 | 200 | Not a Triangle |
| 199 | 2 | 1 | Not a Triangle |
| 199 | 2 | 2 | Not a Triangle |
| 199 | 2 | 100 | Not a Triangle |
| 199 | 2 | 199 | Isosceles |
| 199 | 2 | 200 | Scalene |
| 199 | 100 | 1 | Not a Triangle |
| 199 | 100 | 2 | Not a Triangle |
| 199 | 100 | 100 | Isosceles |
| 199 | 100 | 199 | Isosceles |
| 199 | 100 | 200 | Scalene |
| 199 | 199 | 1 | Isosceles |
| 199 | 199 | 2 | Isosceles |
| 199 | 199 | 100 | Isosceles |
| 199 | 199 | 199 | Equilateral |
| 199 | 199 | 200 | Isosceles |
| 199 | 200 | 1 | Not a Triangle |
| 199 | 200 | 2 | Scalene |
| 199 | 200 | 100 | Scalene |
| 199 | 200 | 199 | Isosceles |
| 199 | 200 | 200 | Isosceles |
| 200 | 1 | 1 | Not a Triangle |
| 200 | 1 | 2 | Not a Triangle |
| 200 | 1 | 100 | Not a Triangle |
| 200 | 1 | 199 | Not a Triangle |
| 200 | 1 | 200 | Isosceles |
| 200 | 2 | 1 | Not a Triangle |
| 200 | 2 | 2 | Not a Triangle |
| 200 | 2 | 100 | Not a Triangle |
| 200 | 2 | 199 | Scalene |
| 200 | 2 | 200 | Isosceles |
| 200 | 100 | 1 | Not a Triangle |
| 200 | 100 | 2 | Not a Triangle |
| 200 | 100 | 100 | Not a Triangle |
| 200 | 100 | 199 | Scalene |
| 200 | 100 | 200 | Isosceles |
| 200 | 199 | 1 | Not a Triangle |
| 200 | 199 | 2 | Scalene |
| 200 | 199 | 100 | Scalene |
| 200 | 199 | 199 | Isosceles |
| 200 | 199 | 200 | Isosceles |
| 200 | 200 | 1 | Isosceles |

| | | | |
|---|---|---|---|
| 200 | 200 | 2 | Isosceles |
| 200 | 200 | 100 | Isosceles |
| 200 | 200 | 199 | Isosceles |
| 200 | 200 | 200 | Equilateral |

**Results:**

| A | B | C | Expected Output | Actual Output | Result |
|---|---|---|---|---|---|
| 1 | 1 | 1 | Equilateral | Equilateral | Pass |
| 1 | 1 | 2 | Not a Triangle | Isosceles | Fail |
| 1 | 1 | 100 | Not a Triangle | Isosceles | Fail |
| 1 | 1 | 199 | Not a Triangle | Isosceles | Fail |
| 1 | 1 | 200 | Not a Triangle | Isosceles | Fail |
| 1 | 2 | 1 | Not a Triangle | Not a Triangle | Pass |
| 1 | 2 | 2 | Isosceles | Scalene | Fail |
| 1 | 2 | 100 | Not a Triangle | Scalene | Fail |
| 1 | 2 | 199 | Not a Triangle | Scalene | Fail |
| 1 | 2 | 200 | Not a Triangle | Scalene | Fail |
| 1 | 100 | 1 | Not a Triangle | Not a Triangle | Pass |
| 1 | 100 | 2 | Not a Triangle | Not a Triangle | Pass |
| 1 | 100 | 100 | Isosceles | Scalene | Fail |
| 1 | 100 | 199 | Not a Triangle | Scalene | Fail |
| 1 | 100 | 200 | Not a Triangle | Scalene | Fail |
| 1 | 199 | 1 | Not a Triangle | Not a Triangle | Pass |
| 1 | 199 | 2 | Not a Triangle | Not a Triangle | Pass |
| 1 | 199 | 100 | Not a Triangle | Not a Triangle | Pass |
| 1 | 199 | 199 | Isosceles | Scalene | Fail |
| 1 | 199 | 200 | Not a Triangle | Scalene | Fail |
| 1 | 200 | 1 | Not a Triangle | Not a Triangle | Pass |
| 1 | 200 | 2 | Not a Triangle | Not a Triangle | Pass |
| 1 | 200 | 100 | Not a Triangle | Not a Triangle | Pass |
| 1 | 200 | 199 | Not a Triangle | Not a Triangle | Pass |
| 1 | 200 | 200 | Isosceles | Scalene | Fail |
| 2 | 1 | 1 | Not a Triangle | Not a Triangle | Pass |
| 2 | 1 | 2 | Isosceles | Isosceles | Pass |
| 2 | 1 | 100 | Not a Triangle | Scalene | Fail |
| 2 | 1 | 199 | Not a Triangle | Scalene | Fail |
| 2 | 1 | 200 | Not a Triangle | Scalene | Fail |
| 2 | 2 | 1 | Isosceles | Isosceles | Pass |
| 2 | 2 | 2 | Equilateral | Equilateral | Pass |
| 2 | 2 | 100 | Not a Triangle | Isosceles | Fail |
| 2 | 2 | 199 | Not a Triangle | Isosceles | Fail |
| 2 | 2 | 200 | Not a Triangle | Isosceles | Fail |

| | | | | | |
|---|---|---|---|---|---|
| 2 | 100 | 1 | Not a Triangle | Not a Triangle | Pass |
| 2 | 100 | 2 | Not a Triangle | Not a Triangle | Pass |
| 2 | 100 | 100 | Isosceles | Scalene | Fail |
| 2 | 100 | 199 | Not a Triangle | Scalene | Fail |
| 2 | 100 | 200 | Not a Triangle | Scalene | Fail |
| 2 | 199 | 1 | Not a Triangle | Not a Triangle | Pass |
| 2 | 199 | 2 | Not a Triangle | Not a Triangle | Pass |
| 2 | 199 | 100 | Not a Triangle | Not a Triangle | Pass |
| 2 | 199 | 199 | Isosceles | Scalene | Fail |
| 2 | 199 | 200 | Scalene | Scalene | Pass |
| 2 | 200 | 1 | Not a Triangle | Not a Triangle | Pass |
| 2 | 200 | 2 | Not a Triangle | Not a Triangle | Pass |
| 2 | 200 | 100 | Not a Triangle | Not a Triangle | Pass |
| 2 | 200 | 199 | Scalene | Scalene | Pass |
| 2 | 200 | 200 | Isosceles | Scalene | Fail |
| 100 | 1 | 1 | Not a Triangle | Not a Triangle | Pass |
| 100 | 1 | 2 | Not a Triangle | Not a Triangle | Pass |
| 100 | 1 | 100 | Isosceles | Isosceles | Pass |
| 100 | 1 | 199 | Not a Triangle | Scalene | Fail |
| 100 | 1 | 200 | Not a Triangle | Scalene | Fail |
| 100 | 2 | 1 | Not a Triangle | Not a Triangle | Pass |
| 100 | 2 | 2 | Not a Triangle | Not a Triangle | Pass |
| 100 | 2 | 100 | Isosceles | Isosceles | Pass |
| 100 | 2 | 199 | Not a Triangle | Scalene | Fail |
| 100 | 2 | 200 | Not a Triangle | Scalene | Fail |
| 100 | 100 | 1 | Isosceles | Isosceles | Pass |
| 100 | 100 | 2 | Isosceles | Isosceles | Pass |
| 100 | 100 | 100 | Equilateral | Equilateral | Pass |
| 100 | 100 | 199 | Isosceles | Isosceles | Pass |
| 100 | 100 | 200 | Not a Triangle | Isosceles | Fail |
| 100 | 199 | 1 | Not a Triangle | Not a Triangle | Pass |
| 100 | 199 | 2 | Not a Triangle | Not a Triangle | Pass |
| 100 | 199 | 100 | Isosceles | Isosceles | Pass |
| 100 | 199 | 199 | Isosceles | Scalene | Fail |
| 100 | 199 | 200 | Scalene | Scalene | Pass |
| 100 | 200 | 1 | Not a Triangle | Not a Triangle | Pass |
| 100 | 200 | 2 | Not a Triangle | Not a Triangle | Pass |
| 100 | 200 | 100 | Not a Triangle | Not a Triangle | Pass |
| 100 | 200 | 199 | Scalene | Scalene | Pass |
| 100 | 200 | 200 | Isosceles | Scalene | Fail |
| 199 | 1 | 1 | Not a Triangle | Not a Triangle | Pass |
| 199 | 1 | 2 | Not a Triangle | Not a Triangle | Pass |
| 199 | 1 | 100 | Not a Triangle | Not a Triangle | Pass |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | | | |
|---|---|---|---|---|---|
| 199 | 1 | 199 | Scalene | Isosceles | Fail |
| 199 | 1 | 200 | Not a Triangle | Scalene | Fail |
| 199 | 2 | 1 | Not a Triangle | Not a Triangle | Pass |
| 199 | 2 | 2 | Not a Triangle | Not a Triangle | Pass |
| 199 | 2 | 100 | Not a Triangle | Not a Triangle | Pass |
| 199 | 2 | 199 | Isosceles | Isosceles | Pass |
| 199 | 2 | 200 | Scalene | Scalene | Pass |
| 199 | 100 | 1 | Not a Triangle | Not a Triangle | Pass |
| 199 | 100 | 2 | Not a Triangle | Not a Triangle | Pass |
| 199 | 100 | 100 | Isosceles | Scalene | Fail |
| 199 | 100 | 199 | Isosceles | Isosceles | Pass |
| 199 | 100 | 200 | Scalene | Scalene | Pass |
| 199 | 199 | 1 | Isosceles | Isosceles | Pass |
| 199 | 199 | 2 | Isosceles | Isosceles | Pass |
| 199 | 199 | 100 | Isosceles | Isosceles | Pass |
| 199 | 199 | 199 | Equilateral | Equilateral | Pass |
| 199 | 199 | 200 | Isosceles | Isosceles | Pass |
| 199 | 200 | 1 | Not a Triangle | Not a Triangle | Pass |
| 199 | 200 | 2 | Scalene | Scalene | Pass |
| 199 | 200 | 100 | Scalene | Scalene | Pass |
| 199 | 200 | 199 | Isosceles | Isosceles | Pass |
| 199 | 200 | 200 | Isosceles | Scalene | Fail |
| 200 | 1 | 1 | Not a Triangle | Not a Triangle | Pass |
| 200 | 1 | 2 | Not a Triangle | Not a Triangle | Pass |
| 200 | 1 | 100 | Not a Triangle | Not a Triangle | Pass |
| 200 | 1 | 199 | Not a Triangle | Not a Triangle | Pass |
| 200 | 1 | 200 | Isosceles | Isosceles | Pass |
| 200 | 2 | 1 | Not a Triangle | Not a Triangle | Pass |
| 200 | 2 | 2 | Not a Triangle | Not a Triangle | Pass |
| 200 | 2 | 100 | Not a Triangle | Not a Triangle | Pass |
| 200 | 2 | 199 | Scalene | Scalene | Pass |
| 200 | 2 | 200 | Isosceles | Isosceles | Pass |
| 200 | 100 | 1 | Not a Triangle | Not a Triangle | Pass |
| 200 | 100 | 2 | Not a Triangle | Not a Triangle | Pass |
| 200 | 100 | 100 | Not a Triangle | Not a Triangle | Pass |
| 200 | 100 | 199 | Scalene | Scalene | Pass |
| 200 | 100 | 200 | Isosceles | Isosceles | Pass |
| 200 | 199 | 1 | Not a Triangle | Not a Triangle | Pass |
| 200 | 199 | 2 | Scalene | Scalene | Pass |
| 200 | 199 | 100 | Scalene | Scalene | Pass |
| 200 | 199 | 199 | Isosceles | Scalene | Fail |
| 200 | 199 | 200 | Isosceles | Isosceles | Pass |
| 200 | 200 | 1 | Isosceles | Isosceles | Pass |

| | | | | | |
|---|---|---|---|---|---|
| 200 | 200 | 2 | Isosceles | Isosceles | Pass |
| 200 | 200 | 100 | Isosceles | Isosceles | Pass |
| 200 | 200 | 199 | Isosceles | Isosceles | Pass |
| 200 | 200 | 200 | Equilateral | Equilateral | Pass |

## 2. Equivalent class testing

**Testing Data:**

| A | B | C | Expected Output |
|---|---|---|---|
| 5 | 5 | 5 | Equilateral |
| 5 | 5 | 3 | Isosceles |
| 5 | 3 | 5 | Isosceles |
| 3 | 5 | 5 | Isosceles |
| 3 | 4 | 5 | Scalene |
| 8 | 3 | 4 | Not a Triangle |
| 7 | 3 | 4 | Not a Triangle |
| 3 | 8 | 4 | Not a Triangle |
| 3 | 7 | 4 | Not a Triangle |
| 3 | 4 | 8 | Not a Triangle |
| 3 | 4 | 7 | Not a Triangle |

**Results:**

| A | B | C | Expected Output | Actual Output | Results |
|---|---|---|---|---|---|
| 5 | 5 | 5 | Equilateral | Equilateral | Pass |
| 5 | 5 | 3 | Isosceles | Isosceles | Pass |
| 5 | 3 | 5 | Isosceles | Isosceles | Pass |
| 3 | 5 | 5 | Isosceles | Scalene | Fail |
| 3 | 4 | 5 | Scalene | Right Triangle | Fail |
| 8 | 3 | 4 | Not a Triangle | Not a Triangle | Pass |
| 7 | 3 | 4 | Not a Triangle | Not a Triangle | Pass |
| 3 | 8 | 4 | Not a Triangle | Not a Triangle | Pass |
| 3 | 7 | 4 | Not a Triangle | Not a Triangle | Pass |
| 3 | 4 | 8 | Not a Triangle | Scalene | Fail |
| 3 | 4 | 7 | Not a Triangle | Scalene | Fail |

## 3. Decision table-based testing

**Testing Data:**

| A | B | C | Expected Output |
|---:|---:|---:|---|
| 4 | 1 | 2 | Not a Triangle |

| | | | |
|---|---|---|---|
| 1 | 4 | 2 | Not a Triangle |
| 1 | 2 | 4 | Not a Triangle |
| 5 | 2 | 3 | Not a Triangle |
| 3 | 5 | 2 | Not a Triangle |
| 2 | 3 | 5 | Not a Triangle |
| 5 | 5 | 5 | Equilateral |
| 2 | 2 | 3 | Isosceles |
| 2 | 3 | 2 | Isosceles |
| 3 | 2 | 2 | Isosceles |
| 3 | 4 | 5 | Scalene |

**Results:**

| A | B | C | Expected Output | Actual Output | Result |
|---|---|---|---|---|---|
| 4 | 1 | 2 | Not a Triangle | Not a Triangle | Pass |
| 1 | 4 | 2 | Not a Triangle | Not a Triangle | Pass |
| 1 | 2 | 4 | Not a Triangle | Scalene | Fail |
| 5 | 2 | 3 | Not a Triangle | Not a Triangle | Pass |
| 3 | 5 | 2 | Not a Triangle | Not a Triangle | Pass |
| 2 | 3 | 5 | Not a Triangle | Scalene | Fail |
| 5 | 5 | 5 | Equilateral | Equilateral | Pass |
| 2 | 2 | 3 | Isosceles | Isosceles | Pass |
| 2 | 3 | 2 | Isosceles | Isosceles | Pass |
| 3 | 2 | 2 | Isosceles | Scalene | Fail |
| 3 | 4 | 5 | "Scalene" | Right Triangle | Fail |

## Problem 2: Next-Date Problem

1. **Boundary value testing**
   **Testing Data:**

| Input | | | Expected Output |
|---|---|---|---|
| January | 1 | 1812 | January 2, 1812 |
| January | 1 | 1813 | January 2, 1813 |
| January | 1 | 1912 | January 2, 1912 |
| January | 1 | 2011 | January 2, 2011 |
| January | 1 | 2012 | January 2, 2012 |
| January | 2 | 1812 | January 3, 1812 |
| January | 2 | 1813 | January 3, 1813 |
| January | 2 | 1912 | January 3, 1912 |
| January | 2 | 2011 | January 3, 2011 |
| January | 2 | 2012 | January 3, 2012 |
| January | 15 | 1813 | January 16, 1813 |
| January | 15 | 1912 | January 16, 1912 |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | |
|---|---|---|---|
| January | 15 | 2011 | January 16, 2011 |
| January | 15 | 2012 | January 16, 2012 |
| January | 30 | 1812 | January 31, 1812 |
| January | 30 | 1813 | January 31, 1813 |
| January | 30 | 1912 | January 31, 1912 |
| January | 30 | 2011 | January 31, 2011 |
| January | 30 | 2012 | January 31, 2012 |
| January | 31 | 1812 | February 1, 1812 |
| January | 31 | 1813 | February 1, 1813 |
| January | 31 | 1912 | February 1, 1912 |
| January | 31 | 2011 | February 1, 2011 |
| January | 31 | 2012 | February 1, 2012 |
| February | 1 | 1812 | February 2, 1812 |
| February | 1 | 1813 | February 2, 1813 |
| February | 1 | 1912 | February 2, 1912 |
| February | 1 | 2011 | February 2, 2011 |
| February | 1 | 2012 | February 2, 2012 |
| February | 2 | 1812 | February 3, 1812 |
| February | 2 | 1813 | February 3, 1813 |
| February | 2 | 1912 | February 3, 1912 |
| February | 2 | 2011 | February 3, 2011 |
| February | 2 | 2012 | February 3, 2012 |
| February | 15 | 1812 | February 16, 1812 |
| February | 15 | 1813 | February 16, 1813 |
| February | 15 | 1912 | February 16, 1912 |
| February | 15 | 2011 | February 16, 2011 |
| February | 15 | 2012 | February 16, 2012 |
| February | 30 | 1812 | Impossible |
| February | 30 | 1813 | Impossible |
| February | 30 | 1912 | Impossible |
| February | 30 | 2011 | Impossible |
| February | 30 | 2012 | Impossible |
| February | 31 | 1812 | Impossible |
| February | 31 | 1813 | Impossible |
| February | 31 | 1912 | Impossible |
| February | 31 | 2011 | Impossible |
| February | 31 | 2012 | Impossible |
| June | 1 | 1812 | June 1, 1812 |
| June | 1 | 1813 | June 1, 1813 |
| June | 1 | 1912 | June 2, 1912 |
| June | 1 | 2011 | June 2, 2011 |
| June | 1 | 2012 | June 2, 2012 |
| June | 2 | 1812 | June 3, 1812 |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | |
|---|---|---|---|
| June | 2 | 1813 | June 3, 1813 |
| June | 2 | 1912 | June 3, 1912 |
| June | 2 | 2011 | June 3, 2011 |
| June | 2 | 2012 | June 3, 2012 |
| June | 15 | 1812 | June 16, 1812 |
| June | 15 | 1813 | June 16, 1813 |
| June | 15 | 1912 | June 16, 1912 |
| June | 15 | 2011 | June 16, 2011 |
| June | 15 | 2012 | June 16, 2012 |
| June | 30 | 1812 | July 1, 1812 |
| June | 30 | 1813 | July 1, 1813 |
| June | 30 | 1912 | July 1, 1912 |
| June | 30 | 2011 | July 1, 2011 |
| June | 30 | 2012 | July 1, 2012 |
| June | 31 | 1812 | Impossible |
| June | 31 | 1813 | Impossible |
| June | 31 | 1912 | Impossible |
| June | 31 | 2011 | Impossible |
| June | 31 | 2012 | Impossible |
| November | 1 | 1812 | November 2, 1812 |
| November | 1 | 1813 | November 2, 1813 |
| November | 1 | 1912 | November 2, 1912 |
| November | 1 | 2011 | November 2, 2011 |
| November | 1 | 2012 | November 2, 2012 |
| November | 2 | 1812 | November 3, 1812 |
| November | 2 | 1813 | November 3, 1813 |
| November | 2 | 1912 | November 3, 1912 |
| November | 2 | 2011 | November 3, 2011 |
| November | 2 | 2012 | November 3, 2012 |
| November | 15 | 1812 | November 16, 1812 |
| November | 15 | 1813 | November 16, 1813 |
| November | 15 | 1912 | November 16, 1912 |
| November | 15 | 2011 | November 16, 2011 |
| November | 15 | 2012 | November 16, 2012 |
| November | 30 | 1812 | December 1, 1812 |
| November | 30 | 1813 | December 1, 1813 |
| November | 30 | 1912 | December 1, 1912 |
| November | 30 | 2011 | December 1, 2011 |
| November | 30 | 2012 | December 1, 2012 |
| November | 31 | 1812 | Impossible |
| November | 31 | 1813 | Impossible |
| November | 31 | 1912 | Impossible |
| November | 31 | 2011 | Impossible |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | |
|---|---|---|---|
| November | 31 | 2012 | Impossible |
| December | 1 | 1812 | December 2, 1812 |
| December | 1 | 1813 | December 2, 1813 |
| December | 1 | 1912 | December 2, 1912 |
| December | 1 | 2011 | December 2, 2011 |
| December | 1 | 2012 | December 2, 2012 |
| December | 2 | 1812 | December 3, 1812 |
| December | 2 | 1813 | December 3, 1813 |
| December | 2 | 1912 | December 3, 1912 |
| December | 2 | 2011 | December 3, 2011 |
| December | 2 | 2012 | December 3, 2012 |
| December | 15 | 1812 | December 16, 1812 |
| December | 15 | 1813 | December 16, 1813 |
| December | 15 | 1912 | December 16, 1912 |
| December | 15 | 2011 | December 16, 2011 |
| December | 15 | 2012 | December 16, 2012 |
| December | 30 | 1812 | December 31, 1812 |
| December | 30 | 1813 | December 31, 1813 |
| December | 30 | 1912 | December 31, 1912 |
| December | 30 | 2011 | December 31, 2011 |
| December | 30 | 2012 | December 31, 2012 |
| December | 31 | 1812 | January 1, 1813 |
| December | 31 | 1813 | January 1, 1814 |
| December | 31 | 1912 | January 1, 1913 |
| December | 31 | 2011 | January 1, 2012 |
| December | 31 | 2012 | January 1, 2013 |

**Results:**

| **Input** | | | **Expected Output** | **Actual Output** | **Results** |
|---|---|---|---|---|---|
| January | 1 | 1812 | January 2, 1812 | January 2, 1812 | Pass |
| January | 1 | 1813 | January 2, 1813 | January 2, 1813 | Pass |
| January | 1 | 1912 | January 2, 1912 | January 2, 1912 | Pass |
| January | 1 | 2011 | January 2, 2011 | January 2, 2011 | Pass |
| January | 1 | 2012 | January 2, 2012 | January 2, 2012 | Pass |
| January | 2 | 1812 | January 3, 1812 | January 3, 1812 | Pass |
| January | 2 | 1813 | January 3, 1813 | January 3, 1813 | Pass |
| January | 2 | 1912 | January 3, 1912 | January 3, 1912 | Pass |
| January | 2 | 2011 | January 3, 2011 | January 3, 2011 | Pass |
| January | 2 | 2012 | January 3, 2012 | January 3, 2012 | Pass |
| January | 15 | 1813 | January 16, 1813 | January 16, 1813 | Pass |
| January | 15 | 1912 | January 16, 1912 | January 16, 1912 | Pass |
| January | 15 | 2011 | January 16, 2011 | January 16, 2011 | Pass |
| January | 15 | 2012 | January 16, 2012 | January 16, 2012 | Pass |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | | | |
|---|---|---|---|---|---|
| January | 30 | 1812 | January 31, 1812 | January 31, 1812 | Pass |
| January | 30 | 1813 | January 31, 1813 | January 31, 1813 | Pass |
| January | 30 | 1912 | January 31, 1912 | January 31, 1912 | Pass |
| January | 30 | 2011 | January 31, 2011 | January 31, 2011 | Pass |
| January | 30 | 2012 | January 31, 2012 | January 31, 2012 | Pass |
| January | 31 | 1812 | February 1, 1812 | February 1, 1812 | Pass |
| January | 31 | 1813 | February 1, 1813 | February 1, 1813 | Pass |
| January | 31 | 1912 | February 1, 1912 | February 1, 1912 | Pass |
| January | 31 | 2011 | February 1, 2011 | February 1, 2011 | Pass |
| January | 31 | 2012 | February 1, 2012 | February 1, 2012 | Pass |
| February | 1 | 1812 | February 2, 1812 | February 2, 1812 | Pass |
| February | 1 | 1813 | February 2, 1813 | February 2, 1813 | Pass |
| February | 1 | 1912 | February 2, 1912 | February 2, 1912 | Pass |
| February | 1 | 2011 | February 2, 2011 | February 2, 2011 | Pass |
| February | 1 | 2012 | February 2, 2012 | February 2, 2012 | Pass |
| February | 2 | 1812 | February 3, 1812 | February 3, 1812 | Pass |
| February | 2 | 1813 | February 3, 1813 | February 3, 1813 | Pass |
| February | 2 | 1912 | February 3, 1912 | February 3, 1912 | Pass |
| February | 2 | 2011 | February 3, 2011 | February 3, 2011 | Pass |
| February | 2 | 2012 | February 3, 2012 | February 3, 2012 | Pass |
| February | 15 | 1812 | February 16, 1812 | February 16, 1812 | Pass |
| February | 15 | 1813 | February 16, 1813 | February 16, 1813 | Pass |
| February | 15 | 1912 | February 16, 1912 | February 16, 1912 | Pass |
| February | 15 | 2011 | February 16, 2011 | February 16, 2011 | Pass |
| February | 15 | 2012 | February 16, 2012 | February 16, 2012 | Pass |
| February | 30 | 1812 | Impossible | March 1, 1812 | Fail |
| February | 30 | 1813 | Impossible | March 1, 1813 | Fail |
| February | 30 | 1912 | Impossible | March 1, 1912 | Fail |
| February | 30 | 2011 | Impossible | March 1, 2011 | Fail |
| February | 30 | 2012 | Impossible | March 1, 2012 | Fail |
| February | 31 | 1812 | Impossible | March 1, 1812 | Fail |
| February | 31 | 1813 | Impossible | March 1, 1813 | Fail |
| February | 31 | 1912 | Impossible | March 1, 1912 | Fail |
| February | 31 | 2011 | Impossible | March 1, 2011 | Fail |
| February | 31 | 2012 | Impossible | March 1, 2012 | Fail |
| June | 1 | 1812 | June 1, 1812 | June 2, 1812 | Fail |
| June | 1 | 1813 | June 1, 1813 | June 2, 1813 | Fail |
| June | 1 | 1912 | June 2, 1912 | June 2, 1912 | Pass |
| June | 1 | 2011 | June 2, 2011 | June 2, 2011 | Pass |
| June | 1 | 2012 | June 2, 2012 | June 2, 2012 | Pass |
| June | 2 | 1812 | June 3, 1812 | June 3, 1812 | Pass |
| June | 2 | 1813 | June 3, 1813 | June 3, 1813 | Pass |
| June | 2 | 1912 | June 3, 1912 | June 3, 1912 | Pass |

| | | | | | |
|---|---|---|---|---|---|
| June | 2 | 2011 | June 3, 2011 | June 3, 2011 | Pass |
| June | 2 | 2012 | June 3, 2012 | June 3, 2012 | Pass |
| June | 15 | 1812 | June 16, 1812 | June 16, 1812 | Pass |
| June | 15 | 1813 | June 16, 1813 | June 16, 1813 | Pass |
| June | 15 | 1912 | June 16, 1912 | June 16, 1912 | Pass |
| June | 15 | 2011 | June 16, 2011 | June 16, 2011 | Pass |
| June | 15 | 2012 | June 16, 2012 | June 16, 2012 | Pass |
| June | 30 | 1812 | July 1, 1812 | July 1, 1812 | Pass |
| June | 30 | 1813 | July 1, 1813 | July 1, 1813 | Pass |
| June | 30 | 1912 | July 1, 1912 | July 1, 1912 | Pass |
| June | 30 | 2011 | July 1, 2011 | July 1, 2011 | Pass |
| June | 30 | 2012 | July 1, 2012 | July 1, 2012 | Pass |
| June | 31 | 1812 | Impossible | July 1, 1812 | Fail |
| June | 31 | 1813 | Impossible | July 1, 1813 | Fail |
| June | 31 | 1912 | Impossible | July 1, 1912 | Fail |
| June | 31 | 2011 | Impossible | July 1, 2011 | Fail |
| June | 31 | 2012 | Impossible | July 1, 2012 | Fail |
| November | 1 | 1812 | November 2, 1812 | November 2, 1812 | Pass |
| November | 1 | 1813 | November 2, 1813 | November 2, 1813 | Pass |
| November | 1 | 1912 | November 2, 1912 | November 2, 1912 | Pass |
| November | 1 | 2011 | November 2, 2011 | November 2, 2011 | Pass |
| November | 1 | 2012 | November 2, 2012 | November 2, 2012 | Pass |
| November | 2 | 1812 | November 3, 1812 | November 3, 1812 | Pass |
| November | 2 | 1813 | November 3, 1813 | November 3, 1813 | Pass |
| November | 2 | 1912 | November 3, 1912 | November 3, 1912 | Pass |
| November | 2 | 2011 | November 3, 2011 | November 3, 2011 | Pass |
| November | 2 | 2012 | November 3, 2012 | November 3, 2012 | Pass |
| November | 15 | 1812 | November 16, 1812 | November 16, 1812 | Pass |
| November | 15 | 1813 | November 16, 1813 | November 16, 1813 | Pass |
| November | 15 | 1912 | November 16, 1912 | November 16, 1912 | Pass |
| November | 15 | 2011 | November 16, 2011 | November 16, 2011 | Pass |
| November | 15 | 2012 | November 16, 2012 | November 16, 2012 | Pass |
| November | 30 | 1812 | December 1, 1812 | December 1, 1812 | Pass |
| November | 30 | 1813 | December 1, 1813 | December 1, 1813 | Pass |
| November | 30 | 1912 | December 1, 1912 | December 1, 1912 | Pass |
| November | 30 | 2011 | December 1, 2011 | December 1, 2011 | Pass |
| November | 30 | 2012 | December 1, 2012 | December 1, 2012 | Pass |
| November | 31 | 1812 | Impossible | December 1, 1812 | Fail |
| November | 31 | 1813 | Impossible | December 1, 1813 | Fail |
| November | 31 | 1912 | Impossible | December 1, 1912 | Fail |
| November | 31 | 2011 | Impossible | December 1, 2011 | Fail |
| November | 31 | 2012 | Impossible | December 1, 2012 | Fail |
| December | 1 | 1812 | December 2, 1812 | December 2, 1812 | Pass |

| | | | | | |
|---|---|---|---|---|---|
| December | 1 | 1813 | December 2, 1813 | December 2, 1813 | Pass |
| December | 1 | 1912 | December 2, 1912 | December 2, 1912 | Pass |
| December | 1 | 2011 | December 2, 2011 | December 2, 2011 | Pass |
| December | 1 | 2012 | December 2, 2012 | December 2, 2012 | Pass |
| December | 2 | 1812 | December 3, 1812 | December 3, 1812 | Pass |
| December | 2 | 1813 | December 3, 1813 | December 3, 1813 | Pass |
| December | 2 | 1912 | December 3, 1912 | December 3, 1912 | Pass |
| December | 2 | 2011 | December 3, 2011 | December 3, 2011 | Pass |
| December | 2 | 2012 | December 3, 2012 | December 3, 2012 | Pass |
| December | 15 | 1812 | December 16, 1812 | December 16, 1812 | Pass |
| December | 15 | 1813 | December 16, 1813 | December 16, 1813 | Pass |
| December | 15 | 1912 | December 16, 1912 | December 16, 1912 | Pass |
| December | 15 | 2011 | December 16, 2011 | December 16, 2011 | Pass |
| December | 15 | 2012 | December 16, 2012 | December 16, 2012 | Pass |
| December | 30 | 1812 | December 31, 1812 | December 31, 1812 | Pass |
| December | 30 | 1813 | December 31, 1813 | December 31, 1813 | Pass |
| December | 30 | 1912 | December 31, 1912 | December 31, 1912 | Pass |
| December | 30 | 2011 | December 31, 2011 | December 31, 2011 | Pass |
| December | 30 | 2012 | December 31, 2012 | December 31, 2012 | Pass |
| December | 31 | 1812 | January 1, 1813 | January 1, 1812 | Fail |
| December | 31 | 1813 | January 1, 1814 | January 1, 1813 | Fail |
| December | 31 | 1912 | January 1, 1913 | January 1, 1912 | Fail |
| December | 31 | 2011 | January 1, 2012 | January 1, 2011 | Fail |
| December | 31 | 2012 | January 1, 2013 | January 1, 2012 | Fail |

## 2. Equivalent class testing
**Testing Data:**

| **Input** | | | **Expected Output** | |
|---|---|---|---|---|
| April | 15 | 1993 | April 16 | 1993 |
| May | 28 | 1993 | April 29 | 1993 |
| June | 29 | 1993 | April 30 | 1993 |
| July | 30 | 1993 | May 1 | 1993 |
| August | 31 | 1993 | Impossible | |
| September | 15 | 1993 | January 16 | 1993 |
| October | 28 | 1993 | January 29 | 1993 |
| November | 29 | 1993 | January 30 | 1993 |
| December | 30 | 1993 | January 31 | 1993 |
| January | 31 | 1993 | February 1 | 1993 |
| February | 15 | 1993 | December 16 | 1993 |
| March | 28 | 1993 | December 29 | 1993 |
| April | 29 | 1993 | December 30 | 1993 |
| May | 30 | 1993 | December 31 | 1993 |

| | | | | |
|---|---|---|---|---|
| June | 31 | 1993 | January 1 | 1994 |
| July | 15 | 1993 | February 16 | 1993 |
| August | 28 | 1992 | February 29 | 1992 |
| September | 28 | 1993 | March 1 | 1993 |
| October | 29 | 1992 | March 1 | 1992 |
| February | 29 | 1993 | Impossible | |
| February | 30 | 1993 | Impossible | |
| February | 31 | 1993 | Impossible | |

**Results:**

| Input | | | Expected Output | Actual Output | Result |
|---|---|---|---|---|---|
| April | 15 | 1993 | April 16, 1993 | April 16, 1993 | Fail |
| April | 28 | 1993 | April 29, 1993 | April 29, 1993 | Fail |
| April | 29 | 1993 | April 30, 1993 | April 30, 1993 | Fail |
| April | 30 | 1993 | May 1, 1993 | May 1, 1993 | Pass |
| April | 31 | 1993 | Impossible | May 1, 1993 | Fail |
| January | 15 | 1993 | January 16, 1993 | January 16, 1993 | Pass |
| January | 28 | 1993 | January 29, 1993 | January 29, 1993 | Pass |
| January | 29 | 1993 | January 30, 1993 | January 30, 1993 | Pass |
| January | 30 | 1993 | January 31, 1993 | January 31, 1993 | Pass |
| January | 31 | 1993 | February 1, 1993 | February 1, 1993 | Pass |
| December | 15 | 1993 | December 16, 1993 | December 16, 1993 | Pass |
| December | 28 | 1993 | December 29, 1993 | December 29, 1993 | Pass |
| December | 29 | 1993 | December 30, 1993 | December 30, 1993 | Pass |
| December | 30 | 1993 | December 31, 1993 | December 31, 1993 | Pass |
| December | 31 | 1993 | January 1, 1994 | January 1, 1993 | Fail |
| February | 15 | 1993 | February 16, 1993 | February 16, 1993 | Pass |
| February | 28 | 1992 | February 29, 1992 | February 29, 1992 | Pass |
| February | 28 | 1993 | March 1, 1993 | March 1, 1993 | Pass |
| February | 29 | 1992 | March 1, 1992 | March 1, 1992 | Pass |
| February | 29 | 1993 | Impossible | March 1, 1993 | Fail |
| February | 30 | 1993 | Impossible | March 1, 1993 | Fail |
| February | 31 | 1993 | Impossible | March 1, 1993 | Fail |

## 3. Decision table-based testing

**Testing Data:**

| Input | | | Expected Output | |
|---|---|---|---|---|
| April | 15 | 1993 | April 16 | 1993 |
| April | 28 | 1993 | April 29 | 1993 |
| April | 29 | 1993 | April 30 | 1993 |
| April | 30 | 1993 | May 1 | 1993 |
| April | 31 | 1993 | Impossible | |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | | |
|---|---|---|---|---|
| January | 15 | 1993 | January 16 | 1993 |
| January | 28 | 1993 | January 29 | 1993 |
| January | 29 | 1993 | January 30 | 1993 |
| January | 30 | 1993 | January 31 | 1993 |
| January | 31 | 1993 | February 1 | 1993 |
| December | 15 | 1993 | December 16 | 1993 |
| December | 28 | 1993 | December 29 | 1993 |
| December | 29 | 1993 | December 30 | 1993 |
| December | 30 | 1993 | December 31 | 1993 |
| December | 31 | 1993 | January 1 | 1994 |
| February | 15 | 1993 | February 16 | 1993 |
| February | 28 | 1992 | February 29 | 1992 |
| February | 28 | 1993 | March 1 | 1993 |
| February | 29 | 1992 | March 1 | 1992 |
| February | 29 | 1993 | Impossible | |
| February | 30 | 1993 | Impossible | |
| February | 31 | 1993 | Impossible | |

**Results:**

| Input | | | Expected Output | Actual Input | Results |
|---|---|---|---|---|---|
| April | 15 | 1993 | April 16, 1993 | April 16, 1993 | Pass |
| April | 28 | 1993 | April 29, 1993 | April 29, 1993 | Pass |
| April | 29 | 1993 | April 30, 1993 | April 30, 1993 | Pass |
| April | 30 | 1993 | May 1, 1993 | May 1, 1993 | Pass |
| April | 31 | 1993 | Impossible | May 1, 1993 | Fail |
| January | 15 | 1993 | January 16, 1993 | January 16, 1993 | Pass |
| January | 28 | 1993 | January 29, 1993 | January 29, 1993 | Pass |
| January | 29 | 1993 | January 30, 1993 | January 30, 1993 | Pass |
| January | 30 | 1993 | January 31, 1993 | January 31, 1993 | Pass |
| January | 31 | 1993 | February 1, 1993 | February 1, 1993 | Pass |
| December | 15 | 1993 | December 16, 1993 | December 16, 1993 | Pass |
| December | 28 | 1993 | December 29, 1993 | December 29, 1993 | Pass |
| December | 29 | 1993 | December 30, 1993 | December 30, 1993 | Pass |
| December | 30 | 1993 | December 31, 1993 | December 31, 1993 | Pass |
| December | 31 | 1993 | January 1, 1994 | January 1, 1993 | Fail |
| February | 15 | 1993 | February 16, 1993 | February 16, 1993 | Pass |
| February | 28 | 1992 | February 29, 1992 | February 29, 1992 | Pass |
| February | 28 | 1993 | March 1, 1993 | March 1, 1993 | Pass |
| February | 29 | 1992 | March 1, 1992 | March 1, 1992 | Pass |
| February | 29 | 1993 | Impossible | March 1, 1993 | Fail |
| February | 30 | 1993 | Impossible | March 1, 1993 | Fail |
| February | 31 | 1993 | Impossible | March 1, 1993 | Fail |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

## Problem 3: Commission Problem

1. **Boundary value testing**
   **Testing Data:**

| Locks | Stocks | Barrels | Expected Commission |
|---|---|---|---|
| 1 | 1 | 1 | 10 |
| 5 | 5 | 5 | 50 |
| 10 | 9 | 11 | 99.52 |
| 1 | 1 | 1 | 10 |
| 1 | 31 | 1 | 10 |
| 1 | 1 | 37 | 100 |
| 10 | 10 | 10 | 100 |
| 10 | 11 | 9 | 100.75 |
| 1 | 1 | 38 | 103.75 |
| 1 | 32 | 1 | 104.5 |
| 22 | 1 | 1 | 106.75 |
| 15 | 15 | 15 | 175 |
| 38 | 1 | 1 | 214.75 |
| 1 | 57 | 1 | 217 |
| 18 | 17 | 19 | 219.25 |
| 1 | 1 | 69 | 220 |
| 18 | 18 | 18 | 220 |
| 18 | 19 | 17 | 221 |
| 39 | 1 | 1 | 222 |
| 1 | 58 | 1 | 222 |
| 1 | 1 | 70 | 225 |
| 0 | 40 | 45 | 325 |
| 1 | 40 | 45 | 334 |
| 2 | 40 | 45 | 343 |
| 35 | 0 | 45 | 400 |
| 35 | 1 | 45 | 406 |
| 35 | 2 | 45 | 412 |
| 35 | 40 | 0 | 415 |
| 35 | 40 | 1 | 420 |
| 35 | 40 | 2 | 425 |
| 35 | 40 | 45 | 640 |
| 35 | 40 | 89 | 860 |
| 35 | 40 | 90 | 865 |
| 35 | 40 | 91 | 870 |
| 35 | 79 | 45 | 874 |
| 35 | 80 | 45 | 880 |
| 35 | 81 | 45 | 886 |

| | | | |
|---|---|---|---|
| 69 | 40 | 45 | 946 |
| 70 | 40 | 45 | 955 |
| 71 | 40 | 45 | 964 |
| 70 | 80 | 90 | 1420 |

**Results:**

| Locks | Stocks | Barrels | Expected Commission | Actual Commission | Results |
|---|---|---|---|---|---|
| 1 | 1 | 1 | 10 | 10 | Pass |
| 5 | 5 | 5 | 50 | 50 | Pass |
| 10 | 9 | 11 | 99.52 | 99.5 | Fail |
| 1 | 1 | 1 | 10 | 10 | Pass |
| 1 | 31 | 1 | 10 | 100 | Fail |
| 1 | 1 | 37 | 100 | 100 | Pass |
| 10 | 10 | 10 | 100 | 100 | Pass |
| 10 | 11 | 9 | 100.75 | 100.5 | Fail |
| 1 | 1 | 38 | 103.75 | 102.5 | Fail |
| 1 | 32 | 1 | 104.5 | 103 | Fail |
| 22 | 1 | 1 | 106.75 | 104.5 | Fail |
| 15 | 15 | 15 | 175 | 175 | Pass |
| 38 | 1 | 1 | 214.75 | 214.75 | Pass |
| 1 | 57 | 1 | 217 | 217 | Pass |
| 18 | 17 | 19 | 219.25 | 219.25 | Pass |
| 1 | 1 | 69 | 220 | 220 | Pass |
| 18 | 18 | 18 | 220 | 220 | Pass |
| 18 | 19 | 17 | 221 | 341 | Fail |
| 39 | 1 | 1 | 222 | 342 | Fail |
| 1 | 58 | 1 | 222 | 342 | Fail |
| 1 | 1 | 70 | 225 | 345 | Fail |
| 0 | 40 | 45 | 325 | 445 | Fail |
| 1 | 40 | 45 | 334 | 454 | Fail |
| 2 | 40 | 45 | 343 | 463 | Fail |
| 35 | 0 | 45 | 400 | 520 | Fail |
| 35 | 1 | 45 | 406 | 526 | Fail |
| 35 | 2 | 45 | 412 | 532 | Fail |
| 35 | 40 | 0 | 415 | 535 | Fail |
| 35 | 40 | 1 | 420 | 540 | Fail |
| 35 | 40 | 2 | 425 | 545 | Fail |
| 35 | 40 | 45 | 640 | 760 | Fail |
| 35 | 40 | 89 | 860 | 980 | Fail |
| 35 | 40 | 90 | 865 | 985 | Fail |
| 35 | 40 | 91 | 870 | 990 | Fail |
| 35 | 79 | 45 | 874 | 994 | Fail |

| | | | | | |
|---|---|---|---|---|---|
| 35 | 80 | 45 | 880 | 1000 | Fail |
| 35 | 81 | 45 | 886 | 1006 | Fail |
| 69 | 40 | 45 | 946 | 1066 | Fail |
| 70 | 40 | 45 | 955 | 1075 | Fail |
| 71 | 40 | 45 | 964 | 1084 | Fail |
| 70 | 80 | 90 | 1420 | 1540 | Fail |

2. **Equivalent class testing**
   **Testing Data:**

| **Locks** | **Stocks** | **Barrels** | **Expected Commission** |
|---|---|---|---|
| 5 | 5 | 5 | 50 |
| 15 | 15 | 15 | 175 |
| 25 | 25 | 25 | 360 |

**Results:**

| **Locks** | **Stocks** | **Barrels** | **Expected Commission** | **Actual Commission** | **Results** |
|---|---|---|---|---|---|
| 5 | 5 | 5 | 50 | 50 | Pass |
| 15 | 15 | 15 | 175 | 175 | Pass |
| 25 | 25 | 25 | 360 | 480 | Fail |

3. **Decision table-based testing**
   **Testing Data:**

| **Locks** | **Stocks** | **Barrels** | **Expected Commission** |
|---|---|---|---|
| 35 | 40 | 45 | 50 |
| 35 | 40 | 0 | "Impossible" |
| 35 | 40 | 91 | "Impossible" |
| 35 | 0 | 45 | "Impossible" |
| 35 | 0 | 45 | "Impossible" |
| 0 | 40 | 45 | "Impossible" |
| 71 | 40 | 45 | "Impossible" |

**Results:**

| **Locks** | **Stocks** | **Barrels** | **Expected Commission** | **Actual Commission** | **Results** |
|---|---|---|---|---|---|
| 35 | 40 | 45 | 50 | 760 | Fail |
| 35 | 40 | 0 | 0 | 535 | Fail |
| 35 | 40 | 91 | 0 | 990 | Fail |
| 35 | 0 | 45 | 0 | 520 | Fail |

Reem Ezeddin
IT814 - Fall 2022
Mini project 1

| | | | | | |
|---|---|---|---|---|---|
| 35 | 0 | 45 | 0 | 520 | Fail |
| 0 | 40 | 45 | 0 | 445 | Fail |
| 71 | 40 | 45 | 0 | 1084 | Fail |