SE 317: Lab 1

Below are four faulty programs. Each includes test inputs that result in failure. Answer the following questions about each program.

```
/**
 * Find last index of element
 *
 * @param x array to search
 * @param y value to look for
 * @return last index of y in x; -1 if absent
 * @throws NullPointerException if x is null
 */
public int findLast (int[] x, int y)
{
  for (int i=x.length-1; i > 0; i--)
  {
    if (x[i] == y)
    {
      return i;
    }
  }
  return -1;
}
// test:  x = [2, 3, 5]; y = 2; Expected = 0
// Book website: FindLast.java
// Book website: FindLastTest.java
```

```
/**
 * Find last index of zero
 *
 * @param x array to search
 *
 * @return last index of 0 in x; -1 if absent
 * @throws NullPointerException if x is null
 */
public static int lastZero (int[] x)
{
  for (int i = 0; i < x.length; i++)
  {
    if (x[i] == 0)
    {
      return i;
    }
  }
  return -1;
}
// test:  x = [0, 1, 0]; Expected = 2
// Book website: LastZero.java
// Book website: LastZeroTest.java
```

```
/**
 * Count positive elements
 *
 * @param x array to search
 * @return count of positive elements in x
 * @throws NullPointerException if x is null
 */
public int countPositive (int[] x)
{
  int count = 0;
  for (int i=0; i < x.length; i++)
  {
    if (x[i] >= 0)
    {
      count++;
    }
  }
  return count;
}
// test:  x = [-4, 2, 0, 2]; Expected = 2
// Book website: CountPositive.java
// Book website: CountPositiveTest.java
```

```
/**
 * Count odd or positive elements
 *
 * @param x array to search
 * @return count of odd/positive values in x
 * @throws NullPointerException if x is null
 */
public static int oddOrPos(int[] x)
{
  int count = 0;
  for (int i = 0; i < x.length; i++)
  {
    if (x[i]%2 == 1 || x[i] > 0)
    {
      count++;
    }
  }
  return count;
}
// test:  x = [-3, -2, 0, 1, 4]; Expected = 3
// Book website: OddOrPos.java
// Book website: OddOrPosTest.java
```

(a) Explain what is wrong with the given code. Describe the fault precisely by proposing a modification to the code.

(b) If possible, give a test case that does **not** execute the fault. If not, briefly explain why not.

(c) If possible, give a test case that executes the fault, but does **not** result in an error state. If not, briefly explain why not.

(d) If possible, give a test case that results in an error, but **not** a failure. If not, briefly explain why not. Hint: Don't forget about the program counter.

(e) Implement your repair and verify that the given test now produces the expected output. Submit a screen printout or other evidence that your new program works.

Submission:

1- Your original faulty source code in 4 java files (*fileName.java*) in a separate folder, name it "**Original code".** Use the original file names as per the textbook (below)
   - findLast
   - lastZero
   - countPositive
   - oddOrPos
2- A text file including:
   - Your name and NetID
   - your answers including explanations and test cases for each question.
3- Your modified source code in 4 java files (filexx.java) in a separate folder, name it "**Modified code**", with the same names as above.

Put all your work in a zip file and upload it the the course canvas → assignments
Good luck,