Use Eclipse or your favourite text editor to find the bugs in the following four programs. Consider using the following techniques:

- interpret errors being pointed out by Eclipse before compilation (Quickfix option)
- interpret compiler and runtime errors
- use primitive print statements throughout the code to figure out what is wrong
- comment in bits of code one by one to find the problem
- use the Eclipse debugger
  - set breakpoints or conditional breakpoints
  - step through code
  - put down variables or expressions to observe the content

1 Errors 01

```java
class Error01 {
    public static void main(String[] args) {
        int m;
        int n = 5
        System.out.println("Starting with " + m);
        while(n > 0) {
            System.out.println(n);
            n--;
        }
        System.out.println("No errors found");
    }
}
```
2 Errors 02

```java
public class Error02 {
    public static void main(String[] args) {
        String[] names = {"Peter", "Paul", "Petra", "Pit", "Peggy"};
        for (int i = 0; i <= names.length; i++) {
            System.out.println(names[i]);
        }
    }
}
```

3 Errors 03

```java
public class Error03 {
    public static void main(String[] args) {
        int n = Integer.parseInt(args[0]);
        System.out.println("Printing the first "+n+" powers of 2.");
        int i = 0;
        int val = 1;
        while (i <= n) {
            System.out.println(i + " " + val);
            val = 2 * val;
        }
    }
}
```
4 Errors 04

public class Error04 {

    public static void main(String[] args) {

        int n = Integer.parseInt(args[0]);
        System.out.println("Printing the first " + n + " powers of 2.");

        int i = 0;
        int val = 1;

        while (i <= n)
            System.out.println(i + " " + val);
            i = i + 1;
            val = 2 * val;

    }
}

5 Solutions

1. Error01
   • missing semicolon in line 6
   • unknown function \texttt{printn} in line 15
   • uninitialised variable \texttt{m} in line 6

2. Error02
   • \texttt{IndexOutOfBoundsException} because \texttt{for} loop iterates beyond the length of the \texttt{names} array

3. Error03
   • infinite loop because the loop counter \texttt{i} is never incremented within the loop body
   • integer \texttt{val} overflows for very large \texttt{n} or because of infinite loop

4. Error04
   • missing curly braces in line 11 and 15 cause another infinite loop; only line 12 is considered to be part of the \texttt{while} body