

2004 Paper 11 Question 1

Foundations of Programming

- (a) Briefly explain the relationship between the Java classes `Exception` and `RuntimeException` and say how they differ. [4 marks]
- (b) The following program employs the `ArrayIndexOutOfBoundsException` (in the Java library) and also two user-supplied exceptions `TwoException` and `FiveException` (not shown) which are declared as extensions of class `Exception`. Explain how the program works and what output is produced. [6 marks]

```
public class ExceptionTest
{ private static int n=0;
  private static int[] a = {2,3,5,7,11,13,17};

  public static void main(String[] args)
  { while (true)
    { try
      { System.out.println(a[next()]);
      }
      catch(ArrayIndexOutOfBoundsException e) { break; }
      catch(FiveException e) { n++; continue; }
    }
  }

  private static int next() throws FiveException
  { try
    { if (n==2) throw new TwoException();
      if (n==5) throw new FiveException();
    }
    catch(TwoException e) {}
    return n++;
  }
}
```

- (c) For each of the three `catch`-clauses explain whether or not it could be removed without provoking a compile-time error. If so, explain what difference, if any, would occur at run time. [4 marks]
- (d) Explain whether or not the `throws`-clause in the heading of method `next()` could be removed without provoking a compile-time error. [2 marks]
- (e) Explain whether or not your answer to (d) would differ if the `FiveException` were declared as extending `RuntimeException` rather than `Exception`. [4 marks]