Foundations of Programming (Java) 2004 Paper 11 Question 1 (FHK)

The question is clearly designed to test understanding of Exceptions...

(a) Class Exception is the parent class of RuntimeException. Any is
code that might throw an Exception has to be in a try-clause;
an associated catch-clause is mandatory. If these rules are not
adhered to there will be a compile-time error. Code which might
throw a RuntimeException does not have to be guarded. If such
an exception is thrown there will be a run-time error. [4 marks]

(b) The program simply scans through an int array using int n to index
the elements. When n=2 a TwoException is thrown. This is caught
immediately, no action is taken, and there is no effect. When n=5
a FiveException is thrown and this is passed back via a throws
clause to be caught in method main(). The n++ means n is increased
to 6 so element 5 (value 13) is omitted. When n=7 the index is
off the end of the array so an ArrayIndexOutOfBoundsException is
thrown. This is caught and the break in catch-clause results in a
break out of the main loop and the program stops. The output is:

```
2
3
5
7
11
17
```
[6 marks]

(c) The ArrayIndexOutOfBoundsException is a RuntimeException and could be
omitted without provoking a compile-time error. The program would fall
over ungracefully when n runs off the end of the array. Neither of the
the other two Exceptions is a RuntimeException and omitting either of
the associated catch-clauses would provoke a compile time error. Note
that omitting the catch(TwoException e) clause would leave a try
without any associated catch (or finally) which is not permitted.
[4 marks]

(d) Omitting the throws clause would provoke a compile-time error. The
FiveException is not a RuntimeException and must be caught immediately
or declared to be thrown. [2 marks]

(e) If the FiveException were a RuntimeException then omitting the throws
clause would not cause a compile-time error. A RuntimeException for
which there is no immediate catch-clause is passed out just as though

there were an implicit throws-clause. If the associated catch-clause in method main() were also omitted then the program would still compile but there would be a run-time error when the FiveException is thrown.

[4 marks]