

2001 Paper 10 Question 2

Foundations of Programming

- (a) Briefly describe the operation of each of the following Java operators:

& | ^ << >> >>> [6 marks]

- (b) On what primitive types do these operators operate? [2 marks]

- (c) A Java program which is designed to exercise some of these operators begins thus:

```
public class Changes
{ public static void main(String[] args)
  { int n = 0x87654321;
    System.out.println(Integer.toHexString(cross(n)));
    System.out.println(Integer.toHexString(one8(n)));
  }
}
```

The method `cross()` accepts an eight-digit hexadecimal number (for example `0x87654321`) as an argument and interchanges the digits in pairs (returning, in this example, `78563412`).

The method `one8()` also accepts an eight-digit hexadecimal number (such as `0x87654321`) as an argument but interchanges only the three inner pairs of digits (thereby returning, in this example, `86745231`).

Supply the methods `cross()` and `one8()`. [8 marks]

- (d) Write a method `msb()` which accepts an `int n` and returns 0 if `n` is zero but otherwise returns an eight-digit hexadecimal number with a single bit set at the position of the most significant 1 bit in `n`. [4 marks]