Foundations of Programming

(a) Briefly describe ASCII and Unicode and draw attention to any relationship between them. [3 marks]

(b) Briefly explain what a Reader is in the context of reading characters from data. [3 marks]

A novice programmer has written the following copying program which is intended simply to read characters from data one at a time and to write them out.

```java
public class Copying {
    public static void main(String[] args) {
        int ch;
        while ((ch = System.in.read()) != -1)
            System.out.printf("%c", (char) ch);
    }
}
```

(c) Unfortunately this program causes a compile-time error. Explain what the problem is and modify the code so that the program compiles. [3 marks]

(d) The amended program correctly copies data in simple cases but is found to fail when exotic characters are encountered. Why is this? [3 marks]

(e) By exploiting a Reader, rewrite the program so that exotic characters no longer cause any problems. [8 marks]