1. **Primitive Data Types**

(a) Describe what is meant by variable *declaration* and *assignment* with reference to Java's primitive data types. Give valid examples of variable declaration and valid examples of variable assignment. [4]

(b) Provide answers to the questions given below.

i. Is `String` one of Java's eight primitive data types? If it is not, state why this is the case.

ii. Is it possible to convert a numeric value to another numeric type? What are the benefits of doing so, and should the programmer be aware of any potential pitfalls?

iii. When a variable is declared, what initial value does it contain?

[6]

(c) i. Write a short program that, given an 8-bit binary number (stored in an array), converts this number to an unsigned, positive, base-10 integer value. Given the input `00001111` your code should return `15`; given the input `10101010` your code should return the value `170`.

ii. Modify your code so that it also outputs the unsigned, positive, base-10 integer value represented by flipping the bits. In the case of the input `00001111`, as well as outputting `15`, your code should also output `240` (i.e. the value of `11110000`).

iii. Describe how you would modify your code so that the most significant bit (in the input) was to act as a sign bit; that is, the left-most bit determines whether the number is positive (when it is 0) or negative (when it is 1).

[10]