(a) Explain the notion and value of type checking. Illustrate your answer using generic types in Java.  [3 marks]

(b) Explain the notion of type erasure. Why is it used in Java?  [3 marks]

(c) For each of the statements below, state whether they are true or false, and explain why.

(i) `Integer` can be cast to `Number`.  [1 mark]

(ii) `Set<Integer>` can be cast to `Set<Number>`.  [2 marks]

(iii) `Set<Integer>` can be cast to `Set<? extends Number>`.  [2 marks]

(iv) `Set<Integer>` can be cast to `Set<?>`.  [2 marks]

(v) `Set<Set<Integer>>` can be cast to `Set<Set<?>>`.  [2 marks]

(d) Given a generic class `TreeSet<T>`, explain the difference between:

(i) `new TreeSet()`

(ii) `new TreeSet<Object>()`

(iii) `new TreeSet<>()`

When can each of these Java expressions be used and are there any advantages of using one over another?  [5 marks]