4 Object-Oriented Programming (rkh23)

(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]