Extra Credit Homework

cs1007 - Object-oriented programming and design in Java
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Due at final exam.

1. Given an Object X

    a. Write a code snippet to test whether X belongs to the `String` class.

    b. Write a code snippet to test whether X is a subclass of `JPanel`, but not `JPanel` itself.

    c. Write a code snippet to test if X implements the `Cloneable` interface.

2. Take a look at the API for `java.io.PushbackInputStream`.
    a. Describe what is this class and give an example when you would use it. (Don't copy paste the API here).

    b. Give an example of when you should not use this class.

3. What is the difference between type `Class` and `Class<?>`

4.
    a. If you write two Java `int` values to a file using a `DataOutputStream`, and you subsequently read one double value from that file using a `DataInputStream`, will your program crash?

    b. If it does not crash, what will be the value of the double read? Explain.

    c. What would happen if you attempt to write one double value but read one int back?

    d. How about writing one int value but attempting to read one double value back?

5. Describe the difference between `StringTokenizer` and `StreamTokenizer`

6. Given the following code snippet:

```
import java.io.*;

public class ParseFarce {
   public static void main(String args[]) {
      try {
         double result1 = 0;
         double result2 = 0;
         StreamTokenizer st = new StreamTokenizer(new FileReader("input.txt"));
         while (st.nextToken != st.TT_EOF) {
            if ((st.ttype = st.TT_WORD) && (st.sval.compareTo("foo") == 0)) {
               System.out.println(""+result1);
               result1 = 0;
            } else if ((st.ttype = st.TT_NUMBER) {
               result1 = result1 + st.nval;
               result2 = result2 + st.nval;
            }
         }
         System.out.println("finished: " + result2);
      } catch (IOException ioe) {
         System.out.println("Error parsing file input.txt" + e);
      }
   }
}
```

    a. What would be the output from executing the program above if the file "input.txt" contained the following:

        CS 1004 and CS 1007 are courses in which the word foo appears at least 10 times each semester. Every year, at least 6 students ask the origin of foo, but the answer is widely debated. There are only 1 or 2 people in the world who know true origin of foo, and I am fortunately not 1 of them.

7. Describe how you would write a program to count the top 5 frequent characters in a file.