Subtyping and Generics Worksheet
CSE 331

1. Fill in the blanks

- Liskov _____ Principle (LSP): If B is a true subtype of A, then B is

  _____ for A.

- The LSP follows the Principle of Least _____ because anywhere the

  client expects an object of type ___, they could get an object of type ___ and not be

  _____.

- Let S be the true statement "every B is an A". The statement S is

  _____ but not _____ for B to be a subclass of A.

- If B is a true subtype of A, it means that B's specification is _____ than

  A's specification.

  ○ This means that the specification for each of B's methods is

    _____ than the specification for the corresponding method of

    A. This means that each method of B has:

    ■ a _____ (or equivalent) precondition than the

      corresponding method of A, i.e. it requires _____

    ■ a _____ (or equivalent) postcondition than the

      corresponding method of A, i.e. it promises _____

2. TextFile and CsvFile

```
 2  /** Represents a file object on the filesystem.  */
 3  public class TextFile {
 4
 5      /** Open the existing file with the given name or create if it does not exist.
 6       * @param filename - the name of the file to open
 7       * @effects creates a new File object  */
 8      public TextFile(String filename) { ... }
 9
10      /** Save to disc all data that has been written into this File object.  */
11      public void save() { ... }
12
13      /** Close this File object so it can no longer be read or writtten.  */
14      public void close() { ... }
15
16      /** Read a line of text.
17       * @return the line of text as a String  */
18      public String readLine() { ... }
19
20      /** Write a line of text.
21       * @param line - the text to write  */
22      public void writeLine(String line) { ... }
23  }
24
25  /** Represents a CSV file object on the filesystem. Its cells are separated by
26   * a certain separator character, and the contents of each cell are surrounded
27   * by a certain quote character. Quote characters may not occur within the
28   * contents of a cell. */
29  public class CsvFile {
30
31      /** Open the existing file with the given name or create if it does not exist.
32       * @param filename - the name of the file to open
33       * @effects creates a new File object  */
34      public CsvFile(String filename) { ... }
35
36      /** Save to disc all data that has been written into this File object.  */
37      public void save() { ... }
38
39      /** Close this File object so it can no longer be read or writtten. */
40      public void close() { ... }
41
42      /** Read a cell of text.
43       * @param col - the column of the cell to write
44       * @param row - the row of the cell to write
45       * @return the cell of text as a String  */
46      public String readCell(int col, int row) { ... }
47
48      /** Write a cell text.
49       * @param contents - the text to write
50       * @param col - the column of the cell to write
51       * @param row - the row of the cell to write  */
52      public void writeCell(String contents, int col, int row) { ... }
53
54      /** Set the delimiter between cells. Default is "," (comma).  */
55      public void setDelimiter(char delimiter) { ... }
56
57      /** Set the Quote character. Default is '"' (double quote).  */
58      public void setDelimiter(char delimiter) { ... }
59  }
```

2.1. True or False: A CSV file is a text file. (If you do not know what a CSV file is, please look it up on wikipedia now.)

2.2. If CsvFile were a subclass of TextFile, it would inherit all of the methods from TextFile that it does not implement by itself. List these methods.

2.4. If CsvFile were to override TextFile's writeLine method, then the specification would have to change slightly. Describe the change to the specification, and explain whether it would break the Liskov Substitution Principle.

2.5. Describe one possible change to CsvFile that might enable CsvFile to be a subtype of TextFile.