

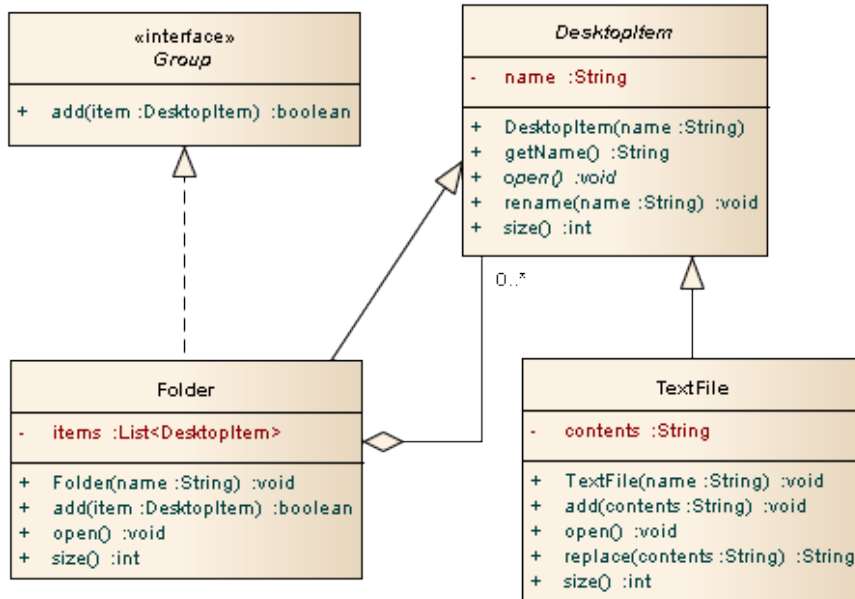
Show all of your work clearly in the space provided or on the additional page at the end of the exam. Be sure to **read each problem carefully**. Note that the exam is double sided.

1. (10 points) Explain what **short-circuit evaluation** is and give an example (show actual code) of when it makes sense to use it.

2. (10 points) Suppose a class, **Parent**, has one constructor that takes one `int` as an argument. Explain why a non-abstract class, **Child**, that extends **Parent** must have at least one constructor implemented.

3. (5 points) Suppose the **Child** class in the previous question is `abstract`. Must the **Child** class have at least one constructor implemented? Justify your answer.

4. Using this UML class diagram, answer the following questions.



(a) (15 points) Provide the complete contents for the Group.java file.

(b) (25 points) Provide the complete contents for the `DesktopItem` file. The `size()` method should return the size of the desktop item's name. If you have any doubt about what a method should do, please ask.

(c) (5 points) Show the class declaration (just the first line) for the `TextFile` class.

(d) (5 points) Show the class declaration (just the first line) for the `Folder` class.

(e) (15 points) Complete the implementation of the `size()` method for the `Folder` class that returns the size of all the desktop items stored in the folder.

```
public int size() {  
    int size =
```

```
        return size;  
}
```

(f) (10 points) Identify any error(s) in the following program and explain why it's an error:

```
public static void main(String [] ignored) {  
    DesktopItem folder = new Folder("se1021");  
    folder.add(new TextFile("file1.txt"));  
    Group grp = folder;  
  
    Folder folder2 = new Folder("se1021");  
    TextFile txt = new TextFile("file2.txt");  
    folder2.add(txt);  
    folder2.add(new Folder("cs2852"));  
  
    System.out.println(txt.replace("Stuff_to_go_in_the_file."));  
    System.out.println(txt.add("Stuff_to_go_in_the_file."));  
  
    grp = folder2;  
    grp.add("file3.txt");  
    System.out.println(folder2.size());  
    System.out.println(grp.size());  
}
```



Additional space — indentify which problem your work is associated with.