Half Exam 2 Name:

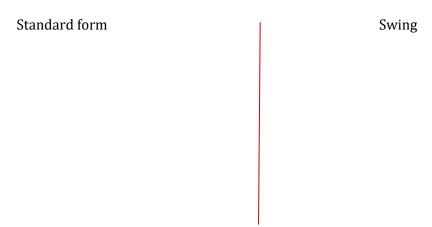
This is a 25-minute exam. The exam is printed double sided. If you use a note-sheet (prepared by yourself), please turn it in with your exam.



- 1. (50 points) *Consider* the Decorator pattern applied to bikes as shown above.
 - a. *Write* client code that uses these classes to create a BMX bike with kickstand and bell.
 - b. *Describe* how the transparency of the program can be improved.
 - c. *Describe* an advantage of increasing the transparency to a client code like you began to write in part a.
 - d. *Describe* a disadvantage of increasing the transparency.
 - e. In the UML diagram at the top of the page, circle the class that is programmed to an interface (uses the interface). *Explain* two advantages of this class using an interface. (Hint: Think about the code you wrote in part a)

2. (30 points) *Edit the method* below to create a space standardizing decorator. This decorator should replace multiple spaces (literal space character 0x20 only, not tab, etc.) with a single space. For example, if the user writes This is fun! This fun! is even more The decorator should write This is fun! This is even more fun! *Add* any instance variables that your code relies on to the class. public class SpaceRemoverWriter extends FilterWriter { @Override public void write(int c) throws IOException { } }

- 3. (20 points) Java Swing uses a slightly different form of the decorator pattern.
 - a. **Sketch** two UML diagrams → one in the standard arrangement used in the decorator pattern, and another in the arrangement used by Java's swing. **Include pattern role** as the name of each class and the **relationships** between classes.



b. *Describe* the advantage of Java Swing's arrangement.