

[**May use one 8.5 × 11 inch sheet of paper for notes.**] Show all of your work clearly in the space provided or on the additional page at the end of the exam. If the additional page is used, clearly identify to which exam question it is related. Be sure to **read each problem carefully**. Note that the exam is double sided.

**1.** (10 points) Provide javadoc comments for the following method that you implemented as part of lab 6.

```
public Fraction add(Fraction fraction) {  
    ...  
}
```

**2.** (10 points) Assign the format string an appropriate value so that the code below produces the following result:

Spot weighs 32.7 kilograms.

```
String format = -----  
String dogName = "Spot";  
double dogWeight = 32.72003;  
System.out.printf(format, dogName, dogWeight);
```

**3.** (12 points) Clearly and concisely describe the object oriented concepts of **objects** and **classes**. Be sure to explain how they are different.

**4.** (12 points) Clearly and concisely describe the difference between **instance variables** and **local variables**.



5. (10 points) Clearly and concisely describe the role of the reserved word `this`.

6. (10 points) Clearly and concisely explain what a constructor does.

7. (20 points) Write a complete implementation of the class shown in the UML class diagram below. You do not need to comment your code.

```
+-----+
|           Dog           |
+-----+
| -height: double        |
| -weight: double        |
| -breed: String         |
+-----+
| +Dog(breed: String)    |
| +getBreed(): String    |
| +getHeight(): double   |
| +getWeight(): double   |
| +setHeight(height: double): void |
| +setWeight(weight: double): void |
+-----+
```



Additional space for **7**.

**8.** (16 points) What does the following code display?

```
public static void main(String[] args) {  
    Dog d1 = new Dog("Lab");  
    Dog d2 = d1;  
    d1.setHeight(1.0);  
    d2.setHeight(2.0);  
    System.out.println(d1.getHeight());  
    System.out.println(d2.getHeight());  
}
```