

COMP 333
Summer 2025

Class-based Inheritance, Subtyping, and Virtual Dispatch (Answers)

1.) Consider the Java class/interface definitions and snippets below. What is the output of the snippet?

1.a)

```
public class Base {  
    public void method() { System.out.println("base"); }  
}  
public class Sub1 extends Base {  
    public void method() { System.out.println("sub1"); }  
}  
public class Sub2 extends Base {}
```

```
// Begin program  
Base a = new Base(); a.method();  
Base b = new Sub1(); b.method();  
Base c = new Sub2(); c.method();  
Sub1 d = new Sub1(); d.method();  
Sub2 e = new Sub2(); e.method();
```

```
base  
sub1  
base  
sub1  
base
```

1.b)

```
public interface MyInterface {  
    public void doSomething();  
}  
public class Foo implements MyInterface {  
    public void doSomething() { System.out.println("Foo"); }  
}  
public class Bar implements MyInterface {  
    public void doSomething() { System.out.println("Bar"); }  
}
```

```
MyInterface a = new Foo(); a.doSomething();  
Foo b = new Foo(); b.doSomething();  
MyInterface c = new Bar(); c.doSomething();  
Bar d = new Bar(); d.doSomething();
```

```
Foo
Foo
Bar
Bar
```

2.) Consider the following Java snippet:

```
boolean b = (randomBoolean()) ? true : false;
if (b) {
    System.out.println("foo");
} else {
    System.out.println("bar");
}
```

This code can be rewritten to entirely avoid the `if`, by using virtual dispatch instead. This code is partially rewritten below, where `...` are different `Conditional` expressions:

```
Conditional c = (randomBoolean()) ? ... : ...;
c.operation();
```

Write the remaining code necessary to make the above snippet operate the same as with the `if`. Include what the two uses of `...` above will need to be. As a hint, you will need classes corresponding to `true` and `false`.

```
public interface Conditional {
    public void operation();
}

public class IfTrue implements Conditional {
    public void operation() { System.out.println("foo"); }
}

public class IfFalse implements Conditional {
    public void operation() { System.out.println("bar"); }
}

Conditional c =
    (randomBoolean()) ? new IfTrue() : new IfFalse();
c.operation();
```