

CSE 401 - Semantics & Type Checking Worksheet - Week 7

All problems in this worksheet will use the following global scope:

```
class Bar { boolean field; public int method(int i, int j); }
class Foo extends Bar { int val; public boolean whoop(int x); }
```

1. Consider the following hypothetical method definition for `Bar.method`:

```
public int method(int i, int j) {
    int r;
    boolean b;
    Foo o;
    if (this.field) {
        o = this;
        b = o.whoop(i + j);
        r = o.val;
    } else {
        r = i * j + 3;
    }
    return r;
}
```

- a. What is the local scope in the method body?
- b. The method body is ill-behaved. Can you prove this by describing a possible execution trace of the method that would “go wrong”? (It suffices to provide possible runtime values for variables in the local scope.)
- c. The method body is also ill-typed. Can you describe which type check(s) deduce this fact?
- d. Is every possible execution trace of that method ill-behaved? Can you describe one that happens to be perfectly well-behaved? (Again, possible runtime values for variables in the local scope suffice.)
- e. Suppose that we replaced the use of `this.field` in the method body to call a boolean method that always returns false. How would this change your answers to the previous questions?