Compiler Construction
Professor Jeremy Siek

Practice Quiz
Classes and Objects

Name: _____

This exam has 3 questions, for a total of 10 points.

1. [2 points] What is the output of the following Python program?

```
x = 1
class C:
    x = 2
    def m(y):
        return x
o = C()
class C:
    def m(self):
        return self.x
    n = C.m
    def __init__(self):
        self.x = 3

print C.n(o)
```

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2. [2 points] What is the output of the following Python program?

```
g = lambda x,n: 1 if n < 2 else g(x, n-2) + x.m(n-1)
class C:
    m = g
o = C()
l = []
for i in [0,1,2,3,4,5]:
    l += [o.m]
for i in [0,1,2,3,4,5]:
    print l[i](i)
```

3. [6 points] Convert the following program in the P_3 subset of Python (includes functions, classes, and obects) into an equivalent P_2 program (includes functions, but not classes and objects). That is, demonstrate that you know how the declassification pass of your compiler works.

```
class C:
    y = 42
class C(C):
   y = 4
   def f(self, x):
      return C.y
   print C.y
   def h(self):
      y = 2
o = C()
o.y = 3
C.h(o)
print C.f(o, 1)
```

You may use the following runtime functions.

```
big_pyobj* create_class(pyobj bases); /* bases should be a list of classes */
big_pyobj* create_object(pyobj cl);
big_pyobj* get_receiver(pyobj o); /* Get the receiver from inside a bound method */
big_pyobj* get_function(pyobj o); /* Get the function from inside a method */
pyobj get_attr(pyobj c, char* attr);
pyobj set_attr(pyobj obj, char* attr, pyobj val);
```

In the translation of function calls, you may omit all of the `if` expressions based on your knowledge of the type of the value in the function position.