Worksheet: Class & objects
COSC 101, 2018-04-16

1) Warm-up
Write a function called nest that takes a list of items and returns a list with each item nested according to its position in the list. For example, nest([1, 2, 3]) should return [1, [2, [3]]] and nest([4]) should return [4]. To help you write the function, first determine: what is the condition for the base case? what is the result for the base case? how will the list be divided in the recursive case?

2) Object-oriented programming
Choose an object in the real world that you may want to represent in a program.
   a) What state variables should the object have?

   b) What functions should the object have?
3) Classes
Assume you are given the following class definition:

class Rectangle:
    """A class representing a rectangle""

    def __init__(self, w, h):
        self.width = w
        self.height = h

    def area(self):
        return self.width * self.height

d) Write a setWidth function for the Rectangle class that takes a width as a parameter and updates the rectangle’s width.
4) Writing classes
Write a class definition for a cylinder. The constructor should take the cylinder’s radius and height. The class should include three functions:

- diameter (a cylinder’s diameter is double its radius)
- volume (the volume of a cylinder is \( h \pi r^2 \))
- setDimensions (which changes the cylinder’s radius and height to new values)

Write a function called cylinder_test (outside of the Cylinder class) that creates two cylinders (with dimensions of your choosing), prints each cylinder’s volume and diameter, updates one cylinder’s dimensions, and prints each cylinder’s volume again.

def cylinder_test():
    a = Cylinder(1, 2)
    b = Cylinder(3, 4)
    print(a.volume(), a.diameter())
    print(b.volume(), b.diameter())
    a.setDimensions(5, 6)
    print(a.volume(), b.volume())