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**CMP 321 - Programming languages Laboratory**

**Lab 10**

**Objectives**

* Understand eval and exec.
* Creating classes programmatically

**Exercise 1:**

Create a Formula() function that takes as argument an algebraic formula (that uses Python syntax) and returns a new class, as follows. The constructor of that class takes as argument a string of comma-separated variable=value pairs. Finally, the class has a calc() method that evaluates its formula using the given variable values and prints the result.

            Example 1 :

> triangle\_hypotenuse = Formula('(a\*a + b\*b)\*\*0.5')

> triangle\_hypotenuse('a=3, b=4') .calc()

5.0

            Example 2 :

> cylinder\_volume = Formula('PI \* r\*\*2 \* h')

> cylinder\_volume('r= 1, h=2') .calc()

6.283185307179586

> cylinder\_volume('r= 2.222, h=3') .calc()

46.532805429259284

            Example 3 – interactive(!) :

> Formula(input('  formula: '))(input('variables: ')).calc()

  formula: a\*x\*x + b\*x + c

variables: a=2.5, b=-6, c = -11, x=0.4

-13.0

**Exercise 2:**

1. Write a function, createSubClass, that take a class as parameter and return a subclass with at least one more attribute and two more method. Assume you have a Polygon class with number of sides as an attribute, createSubClass function should return a subclass say, Triangle with an added attribute list of sides and a function that calculates the area of the triangle.

e.g,

def constructor(self, arg):

self.no\_of\_sides = arg

Polygon= type ('Polygon',(object,),{'no\_of\_sides' :0,

'\_\_init\_\_': constructor,

'getSides':(lambda obj: obj.no\_of\_sides)})

triangle= addSubClass(Polygon)(3)

triangle.setSides(4,5,6)

print(triangle.findArea())

1. Write a function, strFix, that takes a class object as parameter, checks if the class has an \_\_str\_\_() method using getattr, and if not will automatically add one, that prints all the member variables on one line.

print(triangle) prints number of sides, list of sides and area of the triangle.