Introduction to Computer Science Application

Final Exam

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Exercise 1.
Given a function `fun`, defined as follows:

```
def fun(a,b,c):
    if (a>1):
        return 2*fun(a-1,b+1,c)
    elif (b>2):
        return 2+fun(a,b-1,c)
    else:
        return c
```

Decide what is the value of the following three expressions: `fun(1,4,7)`, `fun(2,3,2)` and `fun(3,1,6)`

Exercise 2.
What is the output of the following program?

```
a=[0,1,2]
b=a
a[2]=b[1]
a[1]=[3,2,5]
c=b[1]
c[2]=7
(a,b)=(b,c)
print a
print b
print c
```

Exercise 3.
Write a function `multiplyLists` which takes two arguments, a list `l1` and another list `l2`, and returns a third list `r` with length equal to the length of `l1`. Every element of `r` is obtained from `l2` by multiplying all of its elements by the corresponding element of `l1`. For example `multiplyLists([1,4,2],[3,7])` should return `[[3,7],[12,28],[6,14]]`.

Exercise 4.
Any triangle in the two-dimensional cartesian plane can be described by an object of the class `Triangle`. Every triangle can be described by three pairs of floating point numbers `(x1,y1)`, `(x2,y2)` and `(x3,y3)`, which become the attributes of the class. Write the definition of that class `Triangle`. The class has three methods:

- A constructor `Triangle`, which creates a new object of the class, given its six coordinates.
- A modifier `translate` with two arguments `dx` and `dy`, which translates the triangle by `dx` along the `x` axis and by `dy` along the `y` axis.
- The method `__str__`, whose behaviour should be as expectable as possible.

Exercise 5.
Write a function `deepSum` which returns the sum of all the natural numbers appearing in an arbitrary nested list of natural numbers. For example, `deepSum([[2,6,0],[[1],12],7])` should return the natural number `2+6+0+1+12+7=26`. *Hint:* you can use the built-in function `isinstance(o,t)` which returns `True` if and only if `o` is an object of type `t`.

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