

CS 303 Assignment 3

Deadline Dec 8, 5pm. Submit **discount_calculator_name_surname.py** via email to serhan.aksoy@antalya.edu.tr.

You can submit the answers of other questions as a separate document.

Q1) Generators in Python

a) A chocolate shop has a ten-day promotion. During this period, the price of an item drops 10 percent each day. For example, a chocolate bar that costs 10\$ on the first day costs \$9 on the second day and \$8.1 on the third day.

Write a Python function `discount` that uses the `yield` keyword to calculate the price of an item each day. Fill in the definition of this function in `discount_calculator.py`

b) Explain with **one sentence** why generators are useful.

Q2) Garbage Collection

Consider the program below to answer the questions below.

```
Object [] p = new Object [2];
Object [] q = new Object [2];
Object [] s = new Object [2];
Object [] t = new Object [2];
p[0]= q ;
p[1]= s ;
q[0]= p ;
q[1]= t ;
s[0]= t ;
s[1]= null ;
t[0]= s ;
t[1]= null ;

for ( int i = 0 ; i < 3 ; i++) {
    s = new Object [2];
    t = new Object [2];
    s[0]= t ;
    s[1]= p ;
    t[0]= s ;
    t[1]= q ;
    p[1]= null ;
    q[1]= null ;
    p = s;
    q = t;
}
```

a) Show the configuration of memory cells under reference counting, i.e., how the reference counts change in each step.

b) Suppose we use mark-and-sweep garbage collection algorithm on the same program, and the maximum heap size is 20 memory cells (one cell for one object). When GC action happens, and after GC, what is the configuration of the memory?

Q3) Exceptions

a)

```
class A {
    public static void main(String[] args) {
        int a=0, b=5;
        String c[] = {"X", "Y", "Z"};
        try {
            for(int i=1; i<4; i++) {
                System.out.print(c[i]);
            }
            System.out.print(a/b+b/a);
        }
        catch(ArithmeticException e) {
            System.out.println("A");
        }
        catch(ArrayIndexOutOfBoundsException e) {
            System.out.println("E");
        }
    }
}
```

What will be printed from the Java program above?

b)

```
class A {
    public static void main(String[] args){
        int a=0, b=5;
        String c[] = {"X", "Y", "Z"};
        try {
            System.out.print(c[a/b]);
            try {
                for(int i=0; i<4; i++) {
                    System.out.print(c[i]);
                }
            }
            catch (Exception e){
                System.out.println("A");
            }
            finally {
                System.out.println("B");
            }
        }
        catch (Exception e) {
            System.out.println("C");
        }
        finally {
            System.out.println("D");
        }
    }
}
```

What will be printed from the Java program above?