

Problem 1.

a) Let the class A and B be

```
class A:
    MAX = 1000

    def __init__(self, a_int):
        self.getal = 0 if a_int > MAX else a_int

    def add(self, increment):
        self.getal += increment
        if self.getal > A.MAX:
            self.getal = 0

class B:
    def __init__(self, a_int):
        self.getal = a_int
        self.a = A(self.getal)

    def replace(self, a_obj):
        self.a = a_obj
```

Further we have a program with the following statements

```
a = A(23);
b = B(17);

def show(a_obj, b_obj):
    print '%d %d' % (a_obj.getal, b_obj.a.getal)
```

What will be printed when the following code is executed in this program?

```
show(a, b)
a.add(8)
show(a, b)
a2 = a
show(a2, b)
a = b.a
show(a, b)
b.replace(a2)
show(a, b)
a2.add(2013)
show(a, b)
```

b) Give, using range(), the statements that generate the following lists.

```
1- [0, 1, 2, 3, 4]
2- [100, 101, 102, 103, 104]
3- [100, 102, 104]
```

What lists are generated by the following slices?
The value of m is [1, 2, 3, 4, 5, 6, 7, 8, 9].

```
4- m[3:4]
5- m[3:-1]
6- m[3:]
```

- c) The following heading of a method `ln_plus_1()` is given

```
def ln_plus_1 (x, number_of_terms)
```

The parameter `x` contains a float value and the parameter `number_of_terms` contains an int value. This method should calculate $\ln(x+1)$ using `number_of_terms` terms. In mathematics the definition is as follows:

$$\ln(x+1) = x - 1/2.x^2 + 1/3.x^3 - 1/4.x^4 + 1/5.x^5 - \dots$$

x^n is the notation for "x to the power n". The number of terms that should be used for the calculation is given by `number_of_terms`. Implement this method without using the operator `**` or any method from the module `math`. Assume: `number_of_terms` ≥ 1 .

- d) The following code is given

```
p = 3
q = 7

def show (a, b):
    print '%d, %d' % (a, b)

def m1(x):
    global p
    p *= 2
    q = p + x
    show(p, q)
    return q

def m2(y):
    p = y+2
    q = m1(p)
    show(p, q)
    return p-q

show(p, q)
q = m1(p)
show(p, q)
p = m2(q)
show(p, q)
```

What will be printed when this program is executed?

Problem 2.

- a) The following classes are given.

```
class Plant:

    def __init__(self, a_string, a_boolean1, a_boolean2):
        self.family = a_string
        self.using_wind = a_boolean1
        self.weed = a_boolean2
```

```
class BotanicGarden:
```

```
    def __init__(self):
        self.plant_list = []
```

Write a method add() for the class BotanicGarden that can be used to add 1 Plant to the botanic garden.

- b) Add to the class BotanicGarden a method

```
    def select_family (self, a_string)
```

which, in a new BotanicGarden-object, returns all the plants that are of the family a_string.

Program sub problems in separate methods in the correct class. Use constants when necessary.

- c) The following method can be assumed to be present in the class BotanicGarden. It can be used without having to program it.

```
    def select_using_wind (self)
```

This method returns, in a new BotanicGarden-object, all the plants that use the wind as their means of reproduction.

Now add to the class BotanicGarden a method

```
    def select_family_and_using_wind (self, a_string)
```

This method should return all the plants that are using the wind for reproduction and are of family a_string.

Program the method select_family_and_using_wind() without using a while-statement, a for-statement or a do-while-statement.

- d) Add to the class BotanicGarden a method

```
    def weed (self)
```

This method should remove all weeds from the botanic garden.

An element e in a list m can be removed with the command "m.remove(e)".

grade:

Problem	a	b	c	d	total
1.	5	4	4	5	18
2.	4	4	5	5	18
				-- +	
					36

The grade E follows from the total T using the formula: $E = T / 4 + 1$