University of Bucharest - Faculty of Physics
Informatics (Pascal)

1. What is the result of the expression `10*2 div 3*3 div 2 ?`

a. 0 b. 10 c. 1.11 d. 9

2. If `x%y` is the remainder of the ratio of the integer `x` and the non-zero integer `y` , the following algorithm, written in pseudocode,

```
read a,b (integer numbers)
if a<b then
 s←a; a←b; b←s
■
for x←a,b,-1 do
 if x%2=0 then
  write x,' '
 ■
■
```

will display for `a=5` and `b=17`:

a. `16 14 12 10 8 6` b. `17 15 13 11 9 7` c. `17` d. `0`

3. How many non-oriented distinct graphs with, with `3` vertices can be obtained? Two graphs are considered distinct if their adjacency matrices are different.

a. 2^3 **b.** `6` **c.** 3^2 **d.** `16`

4. The variable `d`, declared in the fragment below, stores in the fields `a` and `b` the width and, respectively, the length of a rectangle. Which of the following statements assigns to the field `p` of the variable `d` the value of the perimeter of the rectangle?

```
type rectangle=record
a,b,p:real
end;
var d:rectangle;
```

a. `p.d = 2*(d.a+d.b);`
b. `p.d = 2*a.d+2*b.d;`
c. `d.p := 2*d.a+2*d.b;`
d. `d.p == 2*d.a+2*d.b;`

5. Consider a stack containing initially the elements `1, 2, 3`, introduced in this order, as in the figure below. `AD(x)` is the operation adding the element `x` on top of the stack and `EL` is the operation eliminating the element on top of the stack. What are the values of the last two elements eliminated from the stack after executing the following sequence of operations: `AD(4);EL;EL;AD(5);EL;EL`?

3	vârf
2	
1	bază

a. 52 **b.** 21 **c.** 32 **d.** 521

6. In the code sequence below a is a string containing at most 100 characters and variables i and k are integers. What is the string displayed after executing that sequence?

```
k:=ord('a')-ord('A');
a:='bacalaureat';
for i:=1 to length(a) do
   if pos(a[i],'aeiou')<>0 then
    a[i]:=chr(ord(a[i])-k);
write(a);
```

a. bclrt
b. bAcAlAUrEAt
c. AAAUEA
d. bacalaureat

7. In the code sequence below, a is a matrix with n rows and n columns (numbered from 0 to n-1) containing integer elements; all other variables are integers. If n is a non-zero natural number, indicate the correct statement which may replace the dots in the sequence, such that its execution will display the sum of the odd integer elements of the row k of the matrix a.

```
s := 0;
for j := 1 to n do
.............
write(s);
```

a. s=s+a[k][j]
b. if a[k,j-1] mod 2<>0 then s:=s+a[k,j-1];
c. if(a[k][j]<>0) s=s+a[k][j]
d. if(a[k][j]%2!=0) write s;

8. Three students intend to create a rock band including a lead guitarist, a bass guitarist and a drummer. All three of them can play all three instruments. The algorithm for generating all the possible structures of the band is equivalent to the algorithm of generating:

a. partial permutations (variations, arrangements)
b. permutations
c. elements of Cartesian product
d. subsets

9. Consider the procedure `f`, defined below. What is the output of the call `f(4)`;?

```
procedure f(n:integer);
 begin
   if n>0 then
    begin
     write(n); f(n-1); write(n)
    end
 end;
```

a. 43211234 **b.** 4321 **c.** 1234 **d.** 10

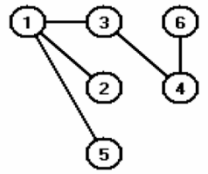
10. Variable `x` is integer and a natural number is assigned to it.
The expression below evaluates to `0` if and only if the expression `x mod 5` evaluates to:
`((x mod 5+1)mod 5+1)mod 5`
a. 1 **b.** 2 **c.** 3 **d.** 4

11. Consider the algorithm below, written in pseudocode. `x%y` is the remainder of the ratio of the natural number `x` and the non-zero natural number `y` . The output after reading, in this order, the numbers `7, 5` is

```
read n,p (non-zero natural numbers)
s←0
for i←1,n do
 j←i
 while j%p≠0 do
  j←j-1
 s←s+j
write s
```

a. 76543 b. 15 c. 28 d. 123

12. Consider the non-oriented graph with six vertices, represented below



The minimum number of links to be added such that in the newly obtained graph each vertex is in a cycle, is :
a. 1 **b.** 2 **c.** 4 **d.** 5