



ALGORITHM COMPLEXITY

P.1. Determine, on the worst case, the temporal cost of a recursive algorithm that works out the factorial of an integer.

P.2. Determine, on the worst case, the temporal cost of the following algorithm:

```
FUNCTION Product(n,m:integer):integer;
  VAR
    i,j,prod:integer;
  BEGIN
    Prod:=0;
    For i:=1 to n do
      For j:= 1 to m do
        Prod:=prod+1;
      Product:=prod
    END; {Product}
```

P.3. Determine, on the worst case, the temporal cost of the following algorithm (an improved version of the previous algorithm).

```
FUNCTION Product(n,m:integer):integer;
  VAR
    i,prod:integer;
  BEGIN
    Prod:=0;
    For i:=1 to n do
      Prod:=prod+m;
    Product:=prod
  END; {Product}
```

P.4. Determine, on the worst case, the temporal cost of the following algorithm (an improved version of the previous algorithm).

```

FUNCTION Product(n,m:integer):integer;
  VAR
    prod:integer;
  BEGIN
    Prod:=0;
    While m>0 do begin
      If Odd(m) then
        Prod:=prod+n;
        n:=n+n;
        m:=m DIV 2;
      end; { while }
    Product:=Prod;
  END; {Product}

```

P.5. Determine, on the worst case, the temporal cost of the Hanoi towers algorithm. How long would it take to move 64 disc from tower “A” to tower “B” if each movement takes one second?.

P.6. Determine, on the worst case, the temporal cost of a recursive algorithm that works out the integer division of two positive integers, if the recurrence case may be defined as:

$$\text{Div}(\text{dividend}, \text{divisor}) = 1 + \text{Div}(\text{dividend} - \text{divisor}, \text{divisor});$$

P.7. Determine, on the worst case, the temporal cost of a recursive algorithm that works out the maximum number of an array as follows:

1. if the array has one element then the maximum number is this one,
2. otherwise the array is divided into two parts and the maximum number of each part is determined. Then both of them are compared. This operation is repeated with that part containing the maximum one (until the array has just one element).