BABEŞ-BOLYAI UNIVERSITY
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

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Written Exam for Computer Science

IMPORTANT NOTE:
Unless further clarification is provided, assume that arithmetical operations are performed over boundless data types (no *overflow* / *underflow*).
Furthermore, arrays and vectors are indexed starting from 1.

1. Let us consider algorithm `decide(n, x)`, where ***n*** is a natural number ($1 \le n \le 10000$) and ***x*** is an array with ***n*** integers (***x***[1], ***x***[2], ..., ***x***[***n***], $-100 \le x[i] \le 100$, for $i = 1, 2, ..., n$):

```
Algorithm decide(n, x):
    b ← True
    i ← 1
    While b = True AND i < n execute
        If x[i] < x[i + 1] then
            b ← True
        else
            b ← False
        EndIf
        i ← i + 1
    EndWhile
    return b
EndAlgorithm
```

In which of the following conditions will the algorithm return *True*?

A. If array ***x*** has elements 1, 2, 3, …, 10.
B. If array ***x*** is strictly increasing.
C. If array ***x*** contains no negative elements.
D. If array ***x*** has positive elements before the negative ones.

2. Let us consider a natural number that does not contain any digits equal to zero, given by array ***a*** (***a***[1], ***a***[2], ..., ***a***[***n***]) that contains its ***n*** digits ($1 \le n \le 10$ at the initial call). State which of the following algorithms return *True* if a number provided in this form is a palindrome and *False* otherwise. A number is a palindrome if its value when read from left to right is equal to its value when read from right to left.

A.

```
Algorithm palindrom_1(a, n):
    i ← 1
    j ← n
    k ← True
    While (i ≤ j) AND (k = True) execute
        If a[i] = a[j] then
            i ← i + 1
            j ← j - 1
        else
            k ← False
        EndIf
    EndWhile
    return k
EndAlgorithm
```

B.

```
Algorithm translatare(a, n):
    For i = 1, n - 1 execute
        a[i] ← a[i + 1]
    EndFor
EndAlgorithm

Algorithm palindrom_2(a, n):
    j ← n
    If (j = 0) OR (j = 1) then
        return True
    EndIf
    If a[1] = a[j] then
        translatare(a, n)
        return palindrom_2(a, n - 2)
    EndIf
    return False
EndAlgorithm
```

C.

```
Algorithm palindrom_3(a, n):
    i ← n
    j ← 1
    k ← True
    sum1 ← 0
    sum2 ← 0
    While (i > n DIV 2) AND (j ≤ n DIV 2)
                                        execute
        sum1 ← sum1 + a[i]
        sum2 ← sum2 + a[j]
        i ← i - 1
        j ← j + 1
    EndWhile
    If sum1 = sum2 then
        k ← True
    else
        k ← False
    EndIf
    return k
EndAlgorithm
```

D.

```
Algorithm palindrom_4(a, n):
    i ← 1
    j ← n
    k ← True
    While (i ≤ j) AND (k = True) execute
        If (a[i] = a[j]) AND (i MOD 2 = 0)
                      AND (j MOD 2 = 0) then
            i ← i + 1
            j ← j - 1
        else
            k ← False
        EndIf
    EndWhile
    return k
EndAlgorithm
```

3. Let us consider algorithm `F(n)`, where ***n*** is a natural number ($1 \leq n \leq 10^9$).

```
Algorithm F(n):
    If n < 10 then
        return n
    EndIf
    u ← n MOD 10
    p ← F(n DIV 10)
    If u MOD 5 ≤ p MOD 5 then
        return u
    EndIf
    return p
EndAlgorithm
```

State which of the following statements are correct:

A. If ***n*** = 812376, the algorithm returns 6.
B. If ***n*** = 8237631, the algorithm returns 1.
C. If ***n*** = 4868, the algorithm returns 8.
D. If ***n*** = 51, the algorithm returns 0.

4. Let us consider algorithm `f(n)`, where the parameter ***n*** is a natural number ($1 \leq n \leq 10^9$).

```
Algorithm f(n):
    v ← 0; z ← 0;
    For c ← 0, 9 execute
        x ← n
        k ← 0
        While x > 0 execute
            If x MOD 10 = c then
                k ← k + 1
            EndIf
            x ← x DIV 10
        EndWhile
        If k > v then
            v ← k
            z ← c
        EndIf
    EndFor
    return z
EndAlgorithm
```

Which of the following statements are true?

A. The algorithm returns the number of digits of number ***n***.
B. The algorithm returns the number of occurrences of the digit with the largest value in number ***n***.
C. The algorithm returns one of the digits with the greatest number of occurrences in the number ***n***.
D. The algorithm returns the number of digits that have the greatest number of occurrences in the number ***n***.

5. Which of the following algorithms prints the binary representation of natural number ***x*** ($0 < x \leq 10^9$ at the initial call) that is provided as a parameter?

A.
```
Algorithm imp(x):
    If x = 0 then
        r ← x MOD 2
        imp(x DIV 2)
        write r
    EndIf
EndAlgorithm
```

B.
```
Algorithm imp(x):
    If x ≠ 0 then
        r ← x MOD 2
        imp(x DIV 2)
        write r
    EndIf
EndAlgorithm
```

C.
```
Algorithm imp(x):
    If x = 0 then
        r ← x DIV 2
        imp(x DIV 2)
        write r
    EndIf
EndAlgorithm
```

D.
```
Algorithm imp(x):
    If x ≠ 0 then
        r ← x MOD 2
        imp(x)
        write r
    EndIf
EndAlgorithm
```

6. Which of the following statements regarding the algorithms in problem statement **5** are true?

A. During the execution of the algorithm from option A nothing is printed.
B. The algorithm from option B will not call itself recursively for any valid value of parameter ***x***
C. The algorithm from option C would be correct if we replaced "`=`" with "`≠`"
D. The algorithm from option D would be correct, if we replaced "`imp(x)`" with "`imp(x DIV 2)`".

7. Let us consider the integer numbers ***a*** and ***b*** ($-1000 \leq a, b \leq 1000$) and the expression:

`NOT ((a > 0) AND (b > 0)).`

Which of the following expressions are equivalent to the given expression?

A. `(NOT (a < 0)) AND (NOT (b < 0))`
B. `(a ≤ 0) AND (b ≤ 0)`
C. `(NOT (a > 0)) OR (NOT (b > 0))`
D. `NOT ((a > 0) OR (b < 0))`

8. Let us consider algorithm `s(n)`, where ***n*** is a natural number ($2 \leq n \leq 10$). The operator / denotes real division (ex. 3 / 2 = 1,5).

```
Algorithm s(n):
    p ← 1
    x ← 0
    For k = 0, n - 1 execute
        p ← p * (k + 1)
        x ← x + 1 / p
    EndFor
    return x
EndAlgorithm
```

Which of the following sums are returned by the algorithm?

A. $\sum_{k=0}^{n} \frac{1}{k!}$
B. $\sum_{k=0}^{n} \frac{1}{k}$
C. $\sum_{k=0}^{n-1} \frac{1}{k!}$
D. $\sum_{k=1}^{n} \frac{1}{k!}$

9. Let us consider algorithm `ceFace(n)`, where ***n*** is a positive natural number ($1 \le n \le 10000$).

```
Algorithm ceFace(n):
    m ← 0
    p ← 10
    While p < n execute
        r ← n MOD p
        m ← m + r
        p ← p * 10
    EndWhile
    return m
EndAlgorithm
```

Which of the following statements are true:

A. For ***n*** = 125 the algorithm returns 521.
B. The algorithm `ceFace(n)` returns the mirrored value of ***n***.
C. For ***n*** = 125 the algorithm returns 155.
D. For ***n*** = 340 the algorithm returns 40.

10. Let us consider algorithm `f(v, n)`, where ***n*** is a non-zero natural number ($1 \le n \le 10000$) and ***v*** is an array with ***n*** positive natural numbers (***v***[1], ***v***[2], ..., ***v***[***n***]). Assume that the algorithm `prim(d)` returns *True* if ***d*** (natural number) is prime and *False* otherwise.

```
Algorithm f(v, n):
    x ← 1
    a ← 0
    For i ← 1, n execute
        For d ← 2, (v[i] DIV 2) execute
            If (prim(d) = True) AND (v[i] MOD d = 0) then
                x ← x * d
            EndIf
        EndFor
    EndFor
    For d ← 2, (x DIV 2) execute
        If (x MOD d = 0) AND (prim(d) = True) then
            a ← a + 1
        EndIf
    EndFor
    return a
EndAlgorithm
```

Which of the following statements are true?

A. The algorithm returns the number of distinct proper prime divisors of all numbers from array ***v***.
B. The algorithm returns the product of the prime divisors of the numbers from array ***v***.
C. The algorithm returns the number of prime numbers from array ***v***.
D. The algorithm returns the total number of divisors of all the numbers from array ***v***.

11. Let us consider algorithm `f(n)`, where ***n*** is a natural number ($0 < n \le 10^9$ at the initial call). The local variable ***v*** is an array.

```
Algorithm f(n):
    m ← 0
    While n > 0 execute
        m ← m + 1
        v[m] ← n MOD 10
        n ← n DIV 10
    EndWhile
    x ← 0
    mx ← 0
    While mx > -1 execute
        x ← x * 10 + mx
        mx ← -1
        j ← 1
        For i = 1, m execute
            If v[i] > mx then
                j ← i
                mx ← v[i]
            EndIf
        EndFor
        v[j] ← -1
    EndWhile
    return x
EndAlgorithm
```

Which of the following statements are true?

A. The algorithm returns the greatest number that can be obtained using the digits of ***n***.
B. The algorithm returns the greatest power of 10 that is a divisor of ***n***.
C. The algorithm returns the first (leftmost) digit of number ***n***.
D. The algorithm returns the sum of the digits of number ***n***.

12. Let us consider algorithm `f(n)`, where parameter ***n*** is a natural number ($1 \leq n \leq 1000^2$ at the initial call).

```
Algorithm f(n):
    z ← 0; p ← 1;
    While n ≠ 0 execute
        c ← n MOD 10
        n ← n DIV 10
        If c MOD 3 = 0 then
            z ← z + p * (9 - c)
            p ← p * 10
        EndIf
    EndWhile
    return z
EndAlgorithm
```

What is the returned value if the algorithm is called with ***n*** = 103456?

A. 639 B. 963 C. 693 D. 369

13. Let us consider algorithm `f(n)` given in problem statement **12**, but now parameter ***n*** is a natural number with two digits ($10 \leq n \leq 99$ at the initial call).

Which of the following options contain only numbers for which the algorithm returns 3?

A. 61, 65, 67
B. 62, 66, 68
C. 16, 56, 76
D. 26, 66, 86

14. Let us consider algorithm `ceFace(a, b)`, where ***a*** and ***b*** are positive natural numbers ($1 \leq \boldsymbol{a}, \boldsymbol{b} \leq 10000$).

```
Algorithm ceFace(a, b):
    For i ← 2, a, 2 execute
        If a MOD i = 0 then
            If b MOD i = 0 then
                Write i
                Write new line
            EndIf
        EndIf
    EndFor
EndAlgorithm
```

If ***a*** = 600, for what values of ***b*** will the execution of algorithm `ceFace(a, b)` print 4 numbers:

A. ***b*** = 20 B. ***b*** = 50 C. ***b*** = 12 D. ***b*** = 90

15. Which of the following statements are true about the algorithm in problem statement **14**?

A. The algorithm prints the common divisors of ***a*** and ***b***.
B. The algorithm prints the common proper divisors of ***a*** and ***b***.
C. The algorithm prints the common odd divisors of ***a*** and ***b***.
D. The algorithm prints the common even divisors of ***a*** and ***b***.

16. Let us consider a program that generates, in ascending order, all natural numbers containing exactly 5 distinct digits that can be formed using the digits: 2, 3, 4, 5, 6.

Specify which number is generated immediately before the following sequence and which number is generated immediately after the following sequence:
34256, 34265, 34526, 34562.

A. 32645 and 34625 B. 32654 and 34655 C. 32654 and 34625 D. 32645 and 34655

17. Let array ***x*** = (1, 1, 2, 2, 2, 2, 3, 3, 3, 3, 3, 3, 4, 4, 4, 4, 4, 4, 4, 4, 5, 5, 5, 5, 5, 5, 5, 5, 5, 5, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 6, 7, ...), which is continued according to the rule that can be observed from the elements that have been enumerated.

Considering that the first element of the array is on position 1, which of the following subsequences will contain only the value **11**?

A. ***x***[100], ..., ***x***[109] B. ***x***[113], ..., ***x***[120] C. ***x***[140], ..., ***x***[152] D. ***x***[123], ..., ***x***[132]

18. How many of the first 100 elements of array ***x*** from problem statement **17** are prime numbers?

A. 4 B. 34 C. 36 D. 30

19. Let us consider the natural numbers ***a*** and ***n*** ($1 \leq \boldsymbol{a}, \boldsymbol{n} \leq 1000$), array ***V*** with ***n*** natural numbers as elements (***V***[1], ***V***[2], ..., ***V***[***n***]) and algorithms `one(a, n, V)` and `two(a, n, V)`:

```
Algorithm one(a, n, V):
    p ← 1; i ← 1;
    While (i ≤ n) AND (a > V[p]) execute
        p ← p + 1
        i ← i + 1
    EndWhile
    return p
EndAlgorithm
```

```
Algorithm two(a, n, V):
    p ← 1; i ← 1;
    While i ≤ n execute
        If a > V[i] then
            p ← p + 1
        EndIf
        i ← i + 1
    EndWhile
    return p
EndAlgorithm
```

What property should vector ***V*** have, such that, for any ***n*** and ***V*** with the given property, the two algorithms will return equal values for any value of ***a***?

A. All elements of array *V* are equal.
B. All elements of array *V* are distinct and sorted in ascending order.
C. All elements of array *V* are distinct and sorted in descending order.
D. All elements of array *V* are sorted in ascending order but are not necessarily distinct.

20. Let us consider algorithm `suma(n)` where ***n*** is a natural number ($0 < n \leq 10000$ at the initial call).

```
Algorithm suma(n):
    If n = 0 then
        return 0
    else
        return suma(n - 1) + n DIV (n + 1) + (n + 1) DIV n
    EndIf
EndAlgorithm
```

Which of the following statements are **NOT** true?

A. The algorithm returns the value ***n*** + 1
B. The algorithm calculates and returns the sum of the proper divisors of ***n***
C. The call `suma(1)` returns 2
D. The algorithm calculates and returns the double of the integer part of the arithmetic mean of the first ***n*** natural numbers

21. Consider the following algorithm, having as input parameters the natural numbers ***a*** and ***b*** ($0 \leq a, b \leq 10000$ at the initial call):

```
Algorithm ceFace(a, b):
    While a * b ≠ 0 execute
        If a > b then
            return ceFace(a MOD b, b)
        else
            return ceFace(a, b MOD a)
        EndIf
    EndWhile
    return a + b
EndAlgorithm
```

Which of the following statements are true?

A. The algorithm returns the sum of numbers ***a*** and ***b***.
B. The algorithm returns the non-zero number ***x*** after the call `ceFace(x, 0)` or `ceFace(0, x)`, and returns 0 for the call `ceFace(0, 0)`.
C. The algorithm returns the greatest common divisor of numbers ***a*** and ***b***.
D. The algorithm returns ***a*** raised to the power ***b***.

22. Let us consider algorithm `afișare(n)` where ***n*** is a natural number ($1 \leq n \leq 10^9$):

```
Algorithm afișare(n):
    For i = 1, n - 1 execute
        For j = i + 1, n execute
            If (j - i) < (n DIV 2) then
                Write i, " ", j - i
                Write new line
            else
                If (j - i) ≠ (n DIV 2) then
                    Write j - i, " ", i
                    Write new line
                EndIf
            EndIf
        EndFor
    EndFor
EndAlgorithm
```

How many pairs of numbers will be displayed when executing the algorithm for $n = 7$?

A. 21 B. 15 C. 11 D. 17

23. Considering the following code sequence, determine how many times the UBB character sequence will be printed, knowing that $n = 3^k$, where k is a natural number ($1 \le k \le 30$)?

```
j ← n
While j > 1 execute
    i ← 1
    While i ≤ n execute
        i ← 3 * i
        Write 'UBB'
    EndWhile
    j ← j DIV 3
EndWhile
```

A. k^2
B. $k * 3^k$
C. $k * (k+1)$
D. $3 * k$

24. Consider the following code sequences and the natural numbers i, j, a, b ($1 < a, b \le 10^9$).

Sequence 1 (S1)

```
i ← 1
While i ≠ b execute
    j ← 1
    While j ≠ a execute
        Write '*'
        j ← j + 1
    EndWhile
    i ← i + 1
EndWhile
```

Sequence 2 (S2)

```
i ← 1
While i ≠ a execute
    j ← 1
    While j ≠ b execute
        Write '*'
        j ← j + 1
    EndWhile
    i ← i + 1
EndWhile
```

Which of the following statements are true?

A. The number of characters printed by sequence **S1** is different than the number of characters printed by sequence **S2**.
B. Both sequences have the same time complexity.
C. The number of characters printed by sequence **S1** is $(a - 1) * (b - 1)$.
D. The number of characters printed by sequence **S2** is $a * b$.

25. Let us consider algorithm `ceFace(nr)`, where nr is a natural number ($100 \le nr \le 2*10^9$ at the initial call).

```
Algorithm testProprietateNr(n):
    If n ≤ 1 then
        return False
    EndIf
    d ← 2
    While d * d ≤ n execute
        If n MOD d = 0 then
            return False
        EndIf
        d ← d + 1
    EndWhile
    return True
EndAlgorithm
```

```
Algorithm ceFace(nr):
    s ← 0
    c1 ← nr MOD 10
    nr ← nr DIV 10
    c2 ← nr MOD 10
    nr ← nr DIV 10
    While nr ≠ 0 execute
        c3 ← nr MOD 10
        t ← c3 * 100 + c2 * 10 + c1
        If testProprietateNr(t) then
            s ← s + c1 + c2 + c3
        EndIf
        c1 ← c2
        c2 ← c3
        nr ← nr DIV 10
    EndWhile
    return s
EndAlgorithm
```

What is the value returned by algorithm `ceFace(nr)` for ***nr*** = 1271211312?

A. 31 B. 32 C. 33 D. 34

26. Which of the following algorithms correctly determines and returns the square root of the natural number ***n*** (0 < ***n*** < 10^5), rounded down to the nearest integer. The / operator denotes real division (ex. 3 / 2 = 1,5).

A.
```
Algorithm radical_A(n):
    x ← 0
    z ← 1
    While z ≤ n execute
        x ← x + 1
        z ← z + 2 * x
        z ← z + 1
    EndWhile
    return x
EndAlgorithm
```

B.
```
Algorithm radical_B(n):
    s ← 1
    d ← n DIV 2
    While s < d execute
        k ← (s + d) DIV 2
        If k * k ≥ n then
            d ← k
        else
            s ← k + 1
        EndIf
    EndWhile
    If s * s ≤ n then
        return s + 1
    else
        return s - 1
    EndIf
EndAlgorithm
```

C.
```
//The algorithm is called initially
//as radical_C(n, n)
Algorithm radical_C(n, x):
    eps ← 0.001
    y ← 0.5 * (x + n / x)
    If x - y < eps then
        //return the integer part
        //of x
        return [x]
    EndIf
    return radical_C(n, y)
EndAlgorithm
```

D.
```
Algorithm radical_D(n):
    s ← 0
    p ← 0
    k ← 0
    While k < n execute
        k ← k + 3 + p
        p ← p + 2
        s ← s + 1
    EndWhile
    return s
EndAlgorithm
```

27. Knowing that ***x*** is a natural number, which of the following expressions are *True* if and only if ***x*** is an even number that does **NOT** belong to the open interval (10, 20)?

A. `NOT((x > 10) AND (x < 20)) AND (NOT (x MOD 2 = 1))`
B. `(x MOD 2 = 0) AND ((x < 10) OR (x > 20))`
C. `NOT(x MOD 2 = 1) AND ((x > 10) AND (x < 20))`
D. `NOT((x MOD 4 = 1) OR (x MOD 4 = 3) OR ((x > 10) AND (x < 20)))`

28. Consider an array ***a*** containing ***n*** distinct natural numbers (***a***[1], ***a***[2], …, ***a***[***n***], 2 ≤ ***n*** ≤ 1000) in strictly ascending order. In an array, a number that is strictly greater than both the number on the previous position and the number on the next position is called a *local peak*. The first and last elements of an array cannot be local peaks. An algorithm is required, named `rearanjare(a, n)`, that rearranges the numbers from the array such that it will contain the maximum number of local peaks and return the new array. The local variable ***b*** is an array. Which of the following algorithms are correct?

A.

```
Algorithm rearanjare(a, n):
    i ← n
    For p ← 2, n, 2 execute
        b[p] ← a[i]
        i ← i – 1
    EndFor
    For p ← 1, n, 2 execute
        b[p] ← a[i]
        i ← i – 1
    EndFor
    return b
EndAlgorithm
```

B.

```
Algorithm rearanjare(a, n):
    i ← n
    For p ← 2, n, 2 execute
        b[p] ← a[i]
        i ← i – 1
        b[p - 1] ← a[i]
        i ← i – 1
    EndFor
    If n MOD 2 = 1 then
        b[n] ← a[i]
    EndIf
    return b
EndAlgorithm
```

C.

```
Algorithm rearanjare(a, n):
    i ← n
    For p ← 2, n, 2 execute
        b[p] ← a[i]
        i ← i – 1
    EndFor
    i ← 1
    For p ← 1, n, 2 execute
        b[p] ← a[i]
        i ← i + 1
    EndFor
    return b
EndAlgorithm
```

D.

```
Algorithm rearanjare(a, n):
    i ← n
    For p ← 2, n, 3 execute
        b[p] ← a[i]
        i ← i – 1
        b[p - 1] ← a[i]
        i ← i – 1
        If p + 1 ≤ n then
            b[p + 1] ← a[i]
            i ← i – 1
        EndIf
    EndFor
    If n MOD 3 = 1 then
        b[n] ← a[i]
    EndIf
    return b
EndAlgorithm
```

29. Let us consider algorithm `f(n, p1, p2)`, where $\boldsymbol{n}$, $\boldsymbol{p1}$ and $\boldsymbol{p2}$ are strictly positive natural numbers ($1 < \boldsymbol{n}, \boldsymbol{p1}, \boldsymbol{p2} \leq 10^4$ at the initial call).

```
Algorithm f(n, p1, p2):
    c ← 0
    While p1 ≤ n execute
        c ← c + n DIV p1
        p1 ← p1 * p2
    EndWhile
    return c
EndAlgorithm
```

Which of the following statements are true?

A. If the three parameters have equal values ($\boldsymbol{n} = \boldsymbol{p1} = \boldsymbol{p2}$), then the algorithm always returns the value 1.
B. If $\boldsymbol{p1} = 5$ and $\boldsymbol{p2} = 5$, the algorithm returns the number of 0 digits that the number $\boldsymbol{n}!$ contains at the end.
C. If $\boldsymbol{p1}$ and $\boldsymbol{p2}$ are equal and greater than 2, then the algorithm returns $[\log_{\boldsymbol{p1}} \boldsymbol{n}]$.
D. None of the other three statements is true.

30. Which of the following algorithms returns the number of *sumative* numbers found in interval $[\boldsymbol{a}, \boldsymbol{b}]$ ($0 < \boldsymbol{a} < \boldsymbol{b} < 10^6$)? A non-zero natural number $\boldsymbol{n}$ is *sumative* if $\boldsymbol{n}^2$ can be written as a sum of $\boldsymbol{n}$ consecutive non-zero natural numbers. For example, 1 and 7 are *sumative* because 1 = 1, respectively 49 = 4 + 5 + 6 + 7 + 8 + 9 + 10.

A.

```
Algorithm sumative(a, b):
    k ← 0
    For i ← a, b execute
        If i MOD 2 ≠ 0 then
            k ← k + 1
        EndIf
    EndFor
    return k
EndAlgorithm
```

B.

```
Algorithm sumative(a, b):
    return (b - a) DIV 2 + (b - a) MOD 2
                       + (a MOD 2 + b MOD 2) DIV 2
EndAlgorithm
```

C.

```
Algorithm sumative(a, b):
  k ← 0
  For i ← a, b execute
    i2 ← i * i
    For j ← 2, i – 1 execute
      If i2 = j * i + (i * (i + 1) DIV 2) then
        k ← k + 1
      EndIf
    EndFor
  EndFor
  return k
EndAlgorithm
```

D.

```
Algorithm sumative(a, b):
  k ← 0
  For i ← a, b execute
    i2 ← i * i
    For j ← 2, i DIV 2 execute
      If i2 = j * i + (i * (i + 1) DIV 2) then
        k ← k + 1
      EndIf
    EndFor
  EndFor
  return k
EndAlgorithm
```