**ALGORITHMS & DATA STRUCTURES DIAGNOSTIC ACTIVITY: Week1**

**SECTION 1:** **PSEUDO-CODE [10 points]**

1. **What is pseudo-code? [3 points]**

* Pseudocode is a plain language description of a computer program intended to be understood by a human rather than executed by a computer.  It uses natural language instructions where convenient and sometimes pseudocode can also involve mathematical notations. It’s used as a manual on algorithms be understood by most developers, regardless of programming language experience. This practice also allows developers to port them to any language as necessary.

1. **Text

   Description automatically generatedConsider the following:**

**2a) Explain the task carried out by each of the lines 2, 3, 4 & 5 [4 points]**

Line 2: It verifies that the values stored in variables i and j are appropriate for the function to be executed. Appropriate means: they are not out of range (i is a positive integer number and j is lower than the number of elements in the array) and index i is positioned to the left of index j. If they are, array A is processed and returned. Otherwise, the array is returned without any change.

Line 3: The index k (used to index the elements of array A) goes from the i-th position to the j-th position of array A

Line 4: It checks whether the element in the k-th position of array A is even

Line 5: As this instruction is executed only if the original value is even, the effect of executing this line is transforming an even number into an odd number.

**2b) What is the return value of F([1,2,3,4,5], 1,3)? [3 points]**

The array is modified to A: [1,3,3,5,5]

**SECTION 2: COMPUTATIONAL COMPLEXITY [10 points]**

Algorithms A and B both return the sum of the elements of the main diagonal of a square matrix (represented as a 2D array).

* 1. **What is the time complexity of algorithms A and B?**

Time complexity of Algorithm A is O(N2) (due to the double loop) Time complexity of Algorithm B is O(N) (due to the single loop)