

HW-3

Part 1: Analyze Insertion Sort:

- ① Method takes 2 parameters, an Array and its length n .
- ② Iterates the array $n-1$ times, starting with $i=1$, goes on until $i=n-1$.
- ③ Sets value key to $Array[i]$ - current index.
- ④ Sets value j as $i-1$ - current value - 1.
- ⑤ While loop checks if $j \geq 0$ and if $Array[j] > key$.
 - If this is true, then it sets $Array[j+1] = Array[j]$, which basically moves the element at position j to position $j+1$.
 - It reduces the value of j to $j-1$.
 - This basically is sorting the left side of the array [until the index i].

⑥ sets $Array[j+1]$ to key .
index

→ The for loop runs for $n-1$ times and while loop runs until the array on the left side of the index is sorted.
- While loop does not run if the array is sorted until index i .

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-(Problem 2) Matrix multiplication Analysis

What does it basically do? given Arrays A & B (2d)

- Multiplies each row of A to each col of B .

• Pseudocode analysis:

1. Takes 2D arrays A & B as input
2. if # of cols of $A \neq$ Row of B , then it throws an "Illegal Argument Exception", since matrix multiplication is not defined in this case.

3. Initialize variables rows = A, cols = A cols, B , & array result [2D array with size of rows $A \times$ cols B filled with 0's].

• ex: if rows $A = 2$ & cols $B = 2$, result array would be initialized with size of $[2][2]$ filled with 0's

4. Uses nested loops [3 for loops], to calculate the dot product of the corresponding row in A & col in B . Its ~~result~~ result is added to the sum. ~~of the corresponding location in the result array.~~

5. The result (sum) is stored in the result matrix.

6. Not in the pseudocode but I am assuming the result array will be returned at the end of the method.