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COM 2005 Data Structures
Midterm Exam, 26.11.2021, 08:30, D-1
Duration : **61** Minutes

SOLUTIONS

```cpp
void insertOrdered(DoublyNode* newNode,
                   DoublyNode* current)
{
    // CODE BLOCK I
    if ((current == trailer) ||
        (newNode->score <= current->score))
    {
        newNode->next = current;
        newNode->prev = current->prev;
        current->prev->next = newNode;
        current->prev = newNode;
    }
    else
        insertOrdered(newNode, current->next);

    // CODE BLOCK II
    if ((current->next == trailer) ||
        (newNode->score <= current->next->score))
    {
        newNode->next = current->next;
        newNode->prev = current;
        current->next->prev = newNode;
        current->next = newNode;
    }
    else
        insertOrdered(newNode, current->next);

    // CODE BLOCK III
    if ((newNode->score >= current->score) &&
        (current != trailer))
        insertOrdered(newNode, current->next);
    else
    {
        newNode->next = current;
        newNode->prev = current->prev;
        current->prev->next = newNode;
        current->prev = newNode;
    }

    // CODE BLOCK IV
    if((newNode->score >= current->next->score) &&
        (current->next != trailer))
        insertOrdered(newNode, current->next);
    else
    {
        newNode->next = current->next;
        newNode->prev = current;
        current->next->prev = newNode;
        current->next = newNode;
    }
}

int main()
{
    DoublyLinkedList list;  DoublyNode* newNode;
    newNode         = new DoublyNode;
    newNode->elem   = "Paul";
    newNode->score  = 720;
    list.insertOrdered(newNode, list.header);
}
```

1. Which code blocks insert Paul without any recursive call? **(25P)**

Assume that **Header**'s and **Trailer**'s scores are **0**.

*You'll loose **5P** from wrong answer.*

(A) I, II

(B) I, III

(C) II, III

(D) II, IV

(E) III, IV

2. Considering **Code Block I**, how many times does the **insertOrdered()** function call itself recursively when adding nodes that have scores 720, 590, 660 and 1105 respectively? **(25P)**

Assume that **Header**'s and **Trailer**'s scores are **0**.

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```cpp
int binarySum(int A[], int i, int n)
{
    if (n == 1)
        return A[i];
    else
    {
        int Sum = binarySum(A, i, n / 2) +
                  binarySum(A, i + n / 2, n / 2);
        cout << Sum << " ";
        return Sum;
    }
}

int main()
{
    int A[8] = {1,3,5,7,9,11,13,15};
    int binSum = binarySum(A, 0, 8);
}
```

3. What is the output of the program above?   **(25P)**

4	12	16	20	28	48	64

4. How many times does the **binarySum()** function call itself recursively?   **(25P)**

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