Karadeniz Technical University
Department of Computer Engineering
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COM 2005 Data Structures
Midterm Exam, 01.12.2023, 13:00
Duration : **105** Minutes

	EVALUATION
NUMBER : .... NAME :	
SIGNATURE :	1[.....] 2[.....] 3[.....] 4[.....] 5[.....] SUM[......]

Exam Execution Instructions of Faculty of Enginnering should be obeyed. Questions are related to 1,4,12 of Program Learning Outcomes

```cpp
void newAdd(CircularlyNode* newNode,
           CircularlyNode* front, CircularlyNode* back)
{
    if (newNode->score < front->score)
    {
        back = front;
        front = front->next;
        if (back == cursor)
        {
            cursor->next = newNode;
            newNode->next = front;
            cursor = cursor->next;
            return;
        }
        newAdd(newNode, front, back);
    }
    else
    {
        back->next = newNode;
        newNode->next = front;
    }
}

int main()
{
  CircularlyLinkedList list;
  list.add("Paul", 720);

  CircularlyNode* newNode = new CircularlyNode;
  newNode->elem = "Rose";
  newNode->score = 590;
  list.newAdd(newNode, list.cursor->next, list.cursor);

  newNode = new CircularlyNode;
  newNode->elem = "Anna";
  newNode->score = 660;
  list.newAdd(newNode, list.cursor->next, list.cursor);

  newNode = new CircularlyNode;
  newNode->elem = "Mike";
  newNode->score = 1105;
  list.newAdd(newNode, list.cursor->next, list.cursor);

  newNode = new CircularlyNode;
  newNode->elem = "Jack";
  newNode->score = 510;
  list.newAdd(newNode, list.cursor->next, list.cursor);

  list.print(); // prints cursor->next first
}
```

2. What is the number of **newAdd()** recursive calls for **newNode → ["Jack",510]** ? **(20P)**

☐

1. What is the output of the program above?   **(20P)**


```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[16]= { 1,2,0,3,4,0,5,6,0,7,0,8,0,9,0,10};
    int binSum = binarySum(A, 0, 16);
}
```

3. What is the output of the program above?　　　**(20P)**

4. How many times does the function **binarySum()** call itself recursively?　　　**(20P)**


```cpp
int main()
{
    CircularlyLinkedQueue Queue;

    Queue.enqueue(4);
    Queue.enqueue(3);
    Queue.enqueue(2);
    Queue.enqueue(1);

    Queue.dequeue();
    Queue.dequeue();

    Queue.enqueue(5);
    Queue.enqueue(6);

    Queue.dequeue();
    Queue.dequeue();

    Queue.enqueue(3);
    Queue.enqueue(7);

    Queue.C.print();
}
```

5. What is the output of the program above? **(20P)**