Quiz 1

Time: 1 hr. **Max Marks:10**

1. Let W(n) be the worst-case running time of an algorithm, A(n) be the average case running time and B(n) be the best-case running time of the algorithm. Then which of the following is true:
   A. A(n) + B(n) is O(W(n))
   B. A(n) + B(n) is Θ(W(n))
   C. B(n) + W(n) is Θ(A(n))
   D. B(n) + W(n) is O(A(n))

2. Class B inherits Class A. The __init__ method has not been defined for Class B. Which of the following statements is true:
   A. While instantiating B, the __**init**__ method of object class will be invoked.
   B. While instantiating B, the __**init**__ method of A is automatically invoked.
   C. While instantiating B, the __**init**__ method of A has to be explicitly invoked.
   D. An attempt to instantiate B will give an error.

3. The worst-case occurs in a Binary search algorithm when
   A. Item is somewhere in the middle of the array.
   B. Item is not in the array at all.
   C. Item is the last element in the array.
   D. Item is the last element in the array or is not there at all.

4. Consider the following pseudo-code. Assume that the argument q is an integer queue. What does the following function do?

```
def fun(q,n):
    q.enqueue(0)
    q.enqueue(1)

    for i in range(n):
        a = q.dequeue()
        b = q.dequeue()
        q.enqueue(b)
        q.enqueue(a+b)
        print(a)
```

A. Prints numbers from 0 to n-1
B. Prints numbers from n-1 to 0
C. Prints first n fibonacci numbers in reverse order
D. Prints first n fibonacci numbers

5. A circular Queue of capacity (n - 1) is implemented using an n-sized list. The `enqueue()` and `dequeue()` operations are performed using REAR and FRONT as the variable indices of the list, respectively. Initially, REAR = FRONT = 0. The conditions for the Queue being full and empty are:
   A. empty: (FRONT+1) mod n == REAR; full: (REAR+1) mod n == FRONT
   B. empty: (REAR+1) mod n == FRONT; full: REAR == FRONT
   C. full: (REAR+1) mod n == FRONT; empty: REAR == FRONT
   D. full: (FRONT+1) mod n == REAR; empty: REAR == FRONT

6. Consider the following sequence of operations on an empty stack.
   push(54) push(52) pop() push(55) push(62) s = pop()

   Consider the following sequence of operations on an empty queue.
   enqueue(21) enqueue(24) dequeue() enqueue(28) enqueue(32) q = dequeue()

   The value of s + q is ______

7. Consider the following three claims:
   a. $(n+k)^m = \Theta(n^m)$
   b. $2^{n+1} = O(2^n)$
   c. $2^{2n+1} = O(2^n)$

   Which of these claims are correct?
   A. a and c
   B. a and b
   C. b and c
   D. a, b and c

8. Which of the given options provides the increasing order of asymptotic complexity of functions f1, f2, f3 and f4?

   $f1(n) = 2^n$

   $f2(n) = n^{3/2}$

   $f3(n) = n \log n$

   $f4(n) = n^{\log n}$

A. f2, f3, f1, f4
B. f3, f2, f1, f4
C. f3, f2, f4, f1
D. f2, f3, f1, f4

9. Consider the following pseudo-code of a function that takes a Queue q as an argument and uses a stack s to do the processing.

```
def fun(q):
    s = Stack()

    while (!is_empty(q)):
        s.push(q.dequeue())

    while (!is_empty(s)):
        q.enqueue(s.pop())
```

What does the above function do?

A. Reverses q
B. Removes the last from q
C. It keeps q the same as it was before the call.
D. Makes q empty

10. What is the number of swaps required to sort n elements using selection sort in the worst case?

A. $\Theta(n \log n)$
B. $\Theta(n^2)$
C. $\Theta(n^2 \log n)$
D. $\Theta(n)$