Week 10 Assignment Solution

1. The bisection method is used to find
    a) Derivative of a function at a given point
    b) Numerical integration of a function within a range
    c) Root of a function
    d) None of the above

Solution: (c) The root of the function

2. In ……, the search starts at the beginning of the list and checks every element in the list.
    a) Linear search
    b) Binary search
    c) Hash search
    d) Binary tree search

Solution: (a) Linear search

3. What is the advantage of a recursive approach over an iterative approach?
    a) Consumes less memory
    b) Less code and easy to implement
    c) Consumes more memory
    d) More code has to be written

Solution: (b) Less code and easy to implement

4. What would be the equivalent pointer expression for referring to the array element a[i][j][k][l]?
    a) (((*(a+i)+j)+k)+l)
    b) *(*(*(*(a+i)+j)+k)+l)
    c) (*(*(a+i)+j)+k+l)
    d) *((a+i)+j+k+l)

Solution: (b)

5. What will be output when you will execute the following C code?

```
#include<stdio.h>
int main()
{
   short num[3][2]={2,5,11,17,23,28};
   printf("%d,%d",*(num+2)[0],**(num+1));
   return 0;
}
```

    a) 23,11
    b) 23,23
    c) 11,17
    d) 17,17

Solution: (a) 23,11

(num+2)[0]=(*((num+2)+0))=*(*(num+2))=*(num[2])=num[2][0]=23
And **(num+1)=*(num[1]+0)=num[1][0]=11
This is an example of pointer arithmetic on an array.

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6. Assume size of an integer and a pointer is 4 bytes. What is the output?

```
#include <stdio.h>
#define A 5
#define B 8
#define C 2
int main()
{
  int (*x)[A][B][C];
  printf("%ld",  sizeof(*x));
  return 0;
}
```

Solution: (short answer) 320. Output is 5*8*2*sizeof(int) which is "320" assuming integer size as 4 bytes.

7. Which of the following is not a requirement for binary search algorithm to work correctly?

a) The array must be sorted

b) The array must be of even length

c) The elements in the array must be distinct

d) The array must be stored in contiguous memory locations

Answer: b) The array must be of even length

8. What is the time complexity of binary search algorithm in the worst-case scenario?

a) O(1)

b) O(n)

c) O(log n)

d) $O(n^2)$

Answer: c) O(log n)

9. What happens if an unsorted array is used in binary search algorithm?

a) The algorithm will still work correctly

b) The algorithm will return an error message

c) The algorithm will give a wrong output

d) The algorithm will run infinitely

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Answer: c) The algorithm will give a wrong output

10. What will be the output?

```
#include<stdio.h>
int main()
{
   int x = 5, y = 10;
   int *p = &x, *q = &y;
   *p = *q;
   *q = 20;
   printf("%d %d", x, y);
   return 0;
}
```

a) 5 10
b) 10 20
c) 20 10
d) Compilation error

Solution: (b) 10 20

The value of x is changed to the value of y, which is 10. The value of y is then changed to 20. Therefore, the output is 10 20.