

Home Work Assignment 8

Q1. State True or False :

A recursive algorithm may require more computation time and memory than its iterative version.

Q2. If our universe consists of only the set of nonnegative integers, the even and odd numbers can be characterized as follows: a number is *even* if its predecessor is odd, a number is *odd* if is not even, the number 0 is even by definition. Complete the C functions below which return 1 when the input number *n* is even/odd respectively. Both the functions are defined in the same program and they call each other.

```
int IsEven(unsigned int n)
{
    if (n == 0) {
        return 1;
    }
    else
    {
        return -----;
    }

    int IsOdd(unsigned int n)
    {
        return -----;
    }
}
```

Q3. Answer the following questions for the following code :

```
int S ( int n, int k )
{
    if (k > n) return 0;
    if ( (k == 1) || (k == n) ) return 1;
    return S(n-1,k-1) + k * S(n-1,k);
}
```

- (a) What is the value returned by S(5,3)?
- (b) How many times is S() called (including the outermost call) to compute S(5,3)?
- (c) How many multiplications are performed to compute the value of S(5,3)?

Q4. Convert the following iterative program to a recursive program

```
int sum(int n)
{
    int i, fp = 0, fc = 0, fn;
    for (i = 0; i <= n; i++)
    {
        fn = fc + fp + i;
        fp = fc;
        fc = fn;
    }
    return fc;
}
```

Q5. Given a list of n distinct elements, write a function that lists all permutations of that list.
Given two integers, write a function to sum the numbers without using any arithmetic operators.

Q6. Write a function for multiply(a , b), where a and b are both positive integers, but you can only use the $+$ or $-$ operators.

Q7. A word is considered elfish if it contains the letters: e, l, and f in it, in any order. For example, we would say that the following words are elfish: *whiteleaf*, *tasteful*, *unfriendly*, and *waffles*, because they each contain those letters.

Write a predicate function called `elfish?` that, given a word, tells us if that word is elfish or not.
