

CEN 134 Algorithms and Programming II Midterm I

April 2011

Duration: 90 minutes

1	2	3	4	5	6	7	8	9	10	Total

A

Student Name:

Student ID Number:

Rules

1. Electronic device(phone,calculator,etc.) usage is forbidden.
2. You are not allowed to leave classroom before you finish the exam.
3. Extra paper usage is not allowed, it will not be graded.
4. The exam is totally 100 points.

Good luck. Assistant Prof. Dr. Orhan Dagdeviren

Question 1. (Definitions, 10 points) Explain the concepts given below briefly.

- a) lvalues and rvalues
- b) Sentinel Controlled Loop
- c) Divide and Conqueror Technique

Question 2. (C Indentation, 10 points) Correct the indentation(spacing) and apply good programming practices for the below code.

```
#include<stdio.h>
#define size 5
int main(void)
{
int counter,sum=0,array[size];
for(counter=0;counter<size;counter++)
array[counter]=counter;
while(counter<=size)
{
array[counter]=counter; sum=sum+counter;
counter++;

}
printf("The sum of number from 1 to %d is:%d \n",counter,sum);
return 0;
}
```

The corrected code should be written below:

Question 3. (C Strings, 10 points) Implement the C FUNCTION with necessary comments below:

```
int string_compare(char string1[],int string1_size,char string2[],int string2_size)
```

This function compares two strings and returns 0 if string1 and string2 is equal.

Else if string1 is alphabetically greater returns 1.

Else returns -1.

Question 4. (C Arrays, 10 points) Implement the C FUNCTION with necessary comments below:

```
int linear_search(int array1[],int array1_size,int element)
```

This function searches the element in array1.

If finds returns location of the element, else returns -1.

Question 5. (C Recursive functions, 10 points) Write a RECURSIVE C FUNCTION with necessary comments that finds and returns the sum of even numbers between n and m.

Question 6. (C PROGRAM, 10 points) Write a C PROGRAM with necessary comments which finds the roots of the below function $f(x)$ between $[-20,20]$ interval. Note: Do not write the roots, just write the program that does this operation.

$$f(x)=x^3+6x^2-232x+960$$

Hint: The roots of a function can be find by first applying $f(x)=0$ and finding x .

Question 7. (C PROGRAM, 10 points) Write a C PROGRAM with necessary comments which checks whether 3 numbers can form a triangle. Program should achieve the following:

1. Program waits 3 integer number (a,b,c) from user.
2. Program should check these whether (a,b,c) can form a triangle. The condition is: $|a-b| < c < (a+b)$. If this condition is true please print an information message to the screen.
3. If (a,b,c) can form a triangle program should check the following condition:
 - a. Triangle can be a Right Triangle (*Türkçe:Dik Üçgen*). Assume that c is the largest side of the triangle then the following condition should be true: $c^2 = a^2 + b^2$
If this condition is true, please print an information message to the screen.

Question 8 (C PROGRAM, 10 points). Write a program with necessary comments that finds the electric consumption of a factory per hour. The program should first ask user how many electric energy does this factory spend. Then the program should ask user how many hours does this factory is actively working. Lastly, the program should calculate the amount of electric consumption per hour. This process should be repeated until the user enters -1 for the amount of electric energy spent.

Question 9. (Error Correction, 10 points) Specify each error in the code whether as syntax error or runtime error (5 pts). Then please write the corrected code (5 pts).

```
/ This program finds the positive divisors of 10
#include<stdio.h
int main(void){
{
int k=10,i=0;
while(i<k){
if(k%i==0){
printf("A divisor is found!");
printf("%d is a divisor. After division the result is %d \n",i,(k/i));
}
++i;
}
}
```

Corrected Code should be here:

Question 10 (Flow Chart, 10 points). Draw the flow chart of the below code.

```
/* This program reads grades from user, then counts the number of a, b and c grades. */
#include<stdio.h>
int main(void)
{
    int grade;
    int aCount=0;
    int bCount=0;
    int cCount=0;

    printf("Enter the letter grades. \n");
    printf("Enter EOF charecter to end input. \n");
    while( (grade=getchar())!=EOF )
    {
        switch(grade)
        {
            case 'A':
                aCount++;
                break;
            case 'B':
                bCount++;
                break;
            case 'C':
                cCount++;
                break;
            default:
                printf("invalid grade");
                break;
        }
        printf("Enter the letter grades. \n");
        printf("Enter EOF charecter to end input. \n");
    }
    printf("\n Total grade Counts \n");
    printf("A Count: %d \n",aCount);
    printf("B Count: %d \n",bCount);
    printf("C Count: %d \n",cCount);
    return 0;
}
```