60-140
Introduction to Algorithms and Programming I
Dr. Christie Ezeife
Lab. Exercises #10 (Lab Date: Week 12 of Classes)

Lab Examination --- Nov 23-24, 2009 (sample lab exam)
There are two programming questions. Answer both questions.
Objective:

1. To test the students' ability to write, edit, compile and run programs for solving simple problems without using functions, but using only necessary read, print, assignment and decision instructions.
2. To test students' ability to write, edit, compile and run programs for solving problems with functions, repetitions and arrays.

Instructions

a. For each question, hand in a script file showing your source program file, compilation and running of the program as well as program input and output data.
b. Use of email or web browser is not allowed during this lab exam.
c. Print formatted output as shown for full marks.

Que. 1. Write a C program that determines the average points earned by each of two basket ball teams (say, Teams North and South) in three games given the location of the games and the number of points earned by each team during each game. It is noted that when a game is played at home, the away team gets additional bonus points of 10. Write a program that will read the integer location (e.g., 1 for North or 2 for South) for each game, the number of points for each team, and compute the average points earned by each team.
……………………….   [50 marks]

If Sample Input data is:
Type Game location Team North points and Team South Points
Game 1 :   1   90   100
Type Game location Team North points and Team South Points
Game 2 :   2   78   69
Type Game location Team North points and Team South Points
Game 3 :   2   85   80

Sample Output data is:

Average points for team North is: 91.00
Average points for team South is: 86.33

Suggested Marking Scheme:
Correct program structure in a source file with correct input and output data declarations.
(20 marks)

Correct program structure in a source file with correct logic.   (20 marks)
Correct logic and correct input/output data assignments.   (10 marks)

Solution to Que 1

```c
#include <stdio.h>
void main (void)
 {
     float teamN1, teamS1, teamN2, teamS2, teamN3, teamS3;
     int location1, location2, location3;
     float teamN_avg, teamS_avg, bonusN = 0, bonusS = 0;

     printf("Type Game location  Team North points and Team South Points\n");
     printf("Game 1  :");
     scanf ("%d %f %f", &location1, &teamN1, &teamS1);
     printf("Type Game location  Team North points and Team South Points\n");
     printf("Game 2  :");
     scanf ("%d %f %f", &location2, &teamN2, &teamS2);
     printf("Type Game location  Team North points and Team South Points\n");
     printf("Game 3  :");
     scanf ("%d %f %f", &location3, &teamN3, &teamS3);

     /* assign bonus points to the teams    */
     if (location1 == 1) bonusS += 10;
       else if (location1 == 2) bonusN += 10;
     if (location2 == 1) bonusS += 10;
       else if (location2 == 2) bonusN += 10;
     if (location3 == 1) bonusS += 10;
       else if (location3 == 2) bonusN += 10;


     /*  Now find the averages of the teams' points   */

     teamN_avg = (teamN1 + teamN2 + teamN3 + bonusN)/3.0;
     teamS_avg = (teamS1 + teamS2 + teamS3 + bonusS)/3.0;

     printf("Average points for team North is:\t %0.2f \n",  teamN_avg);
     printf("Average points for team South is:\t %0.2f \n", teamS_avg);

 }
```

Que. 2. Write a C program that uses at least an additional function called by main to calculate and print the product of corresponding elements of two integer arrays with 5 elements each. For example, if the sample input below is typed in, the output produced by the program is the sample output below. You must use a function, array data structure and

repetition logic to solve this problem. You should also print the input and output data with the lines to look like the table below.

………………… [50 marks]

| Sample input data: | | Sample output data: |
Array1	Array2	Product_Array
15	10	150
13	9	117
80	100	8000
5	6	30
16	15	240

Suggested Marking Scheme:
Correct program structure in a source file with correct input and output data declarations.
(10 marks)
Correct program structure in a source file with correct function prototypes.
(10 marks)
Correct program structure in a source file with correct logic having function call(s) with correct actual parameters. (10 marks)
Correct program structure in a source file with correct logic having correct function definitions with correct formal parameters. (10 marks)
Correct logic and input/output data assignments. (10 marks)

Solution to Que 2

```
#include <stdio.h>

void Array_Calc(int [], int [], int []);

void main() {

    int array1[5], array2[5];
    int prod_array[5];

    Array_Calc(array1, array2, prod_array);
}

void Array_Calc(int array1[], int array2[], int product_array[])
{
  int r;
  printf("Type the 5 integers for array1 and array2\n");
  for (r=0; r < 5; r++)
   {
```

```
    scanf("%d  %d", &array1[r], &array2[r]);
  }


  /*compute product_array*/
  printf("\t Array1 \t Array2\t | \t Product \n");
  printf("_____\n");
  for (r=0; r<5; r++)
   {
   product_array[r] = array1[r] * array2[r];


 /*print output*/
    printf ("\t %d \t\t %d\t| \t %d\n", array1[r], array2[r], product_array[r]);
    } /*end of for r  */
  }   /* end of function Array_Calc  */
```

Other Alternative Work this Lab:

Que.1. Revision for final examination may start.

Que 2. Fastloan, a financial company that grants loan to hardworking college students wants you to develop a program, which reads a data file of applicant records and produces an output file containing only records of approved applicants. Loan is granted based on the policy that the total of student's annual living expenses excluding tuition minus the student's yearly work income must not exceed the student's annual tuition. The input file has records on each student applicant specifying student id, name, rent cost, feeding cost, clothing cost, transportation costs, tuition, and annual work income.