

## Section 14

PDS Lab

Lab – 6

12.01.2022

### Instructions:

- Give sufficient comment against each statement in your program.
- You should save each program with the file name (e.g., Lab6\_1.c for the program of Problem 1 in this assignment).
- There is a partial credit even if your program does not run successfully for all the test cases as mentioned.
- There are FIVE problems and you have to solve in 150 minutes. A tentative time against each problem is given and can be considered for your guidance.
- You should upload each program (only .c file) against the problem. There is no need to submit any .zip file at the end of your lab.

1. Two numbers are said to be co-prime, if the greatest common divisor of the numbers is one. For examples, 13 and 14 are co-prime but 14 and 21 are not. Write a C function **void CoPrime(int a, int b)** to test whether the pair of numbers *a* and *b* are co-prime. In the main program, read five numbers and use this function to test how many of them are co-prime.

Test Case# 1:

Input: 11 21 31 41 51

Output: Co prime numbers:

(11 21) (11 31) (11 41) (11 51) (21 31) (21 41)  
(31 41) (31 51) (41 51)

Test Case# 2:

Input: 15 25 35 45 55

Output: Co prime numbers:

None of them are co-prime numbers

Test Case# 3:

Input: 103 213 3363 41235 567849

Output: Co prime numbers:

(103 213) (103 3363) (103 41235) (103 567849)  
(213 567849) (3363 567849) (41235 567849)

[Time: 30 minutes]

[5+3×5]

2. Write a C function say **void GuessMe( )** that assumes a number between 1 and 100 inclusive. In your function, you can call *int rand( )* function, which is defined in C library to assume such a number. From your function prompt the user to guess the number and enter the number he has guessed. If the user guesses the number correctly, print out a congratulatory message and exit. If the user makes a wrong guess, the user is given an opportunity to guess again. The process may be repeated till user guesses correctly. Print the number of guesses a user makes to get the correct value.

For this problem test cases are not given as the function can generate an arbitrary number and so a user can enter.

[Time: 20 minutes]

[5+5]

3. A point in a 2D plane can be represented by two coordinate values (x, y). Write C functions to do the following:
- i) Read a set of points (minimum 4 and maximum 6 points).
  - ii) Find the distance between a pair of points.
  - iii) Whether any three given points constitute an isosceles triangle and if so find the area of the triangle.
  - iv) Whether four points constitute a rectangle and if so find the area of the rectangle.

Call these functions from the main function to find the number of isosceles triangles and rectangles that can be formed by the selected points and then find the one having maximum area in each case.

For this problem, test cases are not given. Students are asked to read minimum 4 and maximum 6 points to test the result.

Test Case# 1:

Co-ordinates to check for an Isosceles Triangle : (1,2)

(3,4) (5,6) (7,8)

(1,2) (3,4) (5,6) form an Isosceles triangle

(3,4) (5,6) (7,8) form an Isosceles triangle

Test Case# 2:

Co-ordinates to check for a Rectangle : (-2,3) (2,-3) (-2,-3) (2,3)

(-2,3) (2,-3) (-2,-3) (2,3) form a Rectangle

[Time: 40 minutes]

[(4×5)+5]

4. Write the following functions.

(a) **int max ()**: To find and return the maximum number in the array

a. (b) **int min ()**: To find and return the minimum number in the array

a.

(c) **int avg ()**: To find and return the average of all the numbers in the array a.

In the main function you do the following:

i) Define an array, say *marks* of type integer of size 100.

ii) Read  $n$  ( $0 \leq n \leq 100$ ) from the keyboard.

iii) Read  $n$  numbers from the keyboard and store them into the array. iv)

Call the functions *max(...)*, *min(...)* and *avg(...)* to calculate the maximum, minimum and average of the numbers in the array.

v) Print the array marks and the results returned by the functions.

For this problem, test cases are not given. Students are asked to read any number for  $n$  and test the results.

[Time: 30 minutes]

[(5×4)+5]

5. A binomial expansion is given as below.

$$(a + x)^n = \sum_{i=0}^n \binom{n}{i} a^i x^{n-i}$$

(a) Define a function *float pow(float x, int n)* to calculate the value of  $x^n$ .

(b) Define a function *float ncr(int n, int r)* to calculate the value of  $\binom{n}{r} = nC_r$

Write a main function to read values for  $a$ ,  $x$  and  $n$  and verify the above binomial expansion.

For this problem, test cases are not given. Students are asked to read values for  $a$ ,  $x$  and  $n$  and verify that both the left- and right-hand parts are valid.

[Time: 30 minutes]

[(2×5)+10]