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CSE117 Problem Solving with C

Handout - Lab Session - 9
Pointers

Objective:

- To be able to declare, define and initialize pointers..
- To be able to access data through pointers. .
- To be able to use pointers as parameters and return types.
- To write programs using arrays and pointer arithmetic.

Pre-Lab: Go through the concepts of pointers. Write the algorithm and flowcharts for this handout's exercise problems.

During Lab: Solve all the exercise problems. You should work on the additional set of programs only after completing this week's tasks.

Post Lab: Take the quiz.

Read Chapters 9 & 10

Lab Exercises

Exercise 1: Arithmetic

Write a program to find the sum, difference, product, and quotient of two numbers using pointers.

Sample Test Cases	Input	Output
Test Case 1	Enter two numbers: 10 20	Sum = 30 Difference = -10 Product = 200 Quotient = 0.5
Test Case 2	Enter two numbers: -10 20	Sum = 10 Difference = -30 Product = -200 Quotient = -0.5

Exercise 2: Even or Odd

Write a program to check if a number is even or odd, using pointers.

Sample Test Cases	Input	Output
Test Case 1	Enter the number: 10	10 is even
Test Case 2	Enter the number: 21	21 is odd

Exercise 3: Swap Two Numbers

Write a function void swap(int*, int*) to swap two numbers.

Sample Test Cases	Input	Output
Test Case 1	Enter the number: 5 10	Before swapping 5 10 After swapping 10 5
Test Case 2	Enter the number: -5 -10	Before swapping -5 -10 After swapping -10 -5

Exercise 4: Find the minimum of two numbers

Write a function int* min(int* p1, int* p2) to determine the minimum of two numbers.

Sample Test Cases	Input	Output
Test Case 1	Enter the number: 5 10	5
Test Case 2	Enter the number: -5 -10	-10

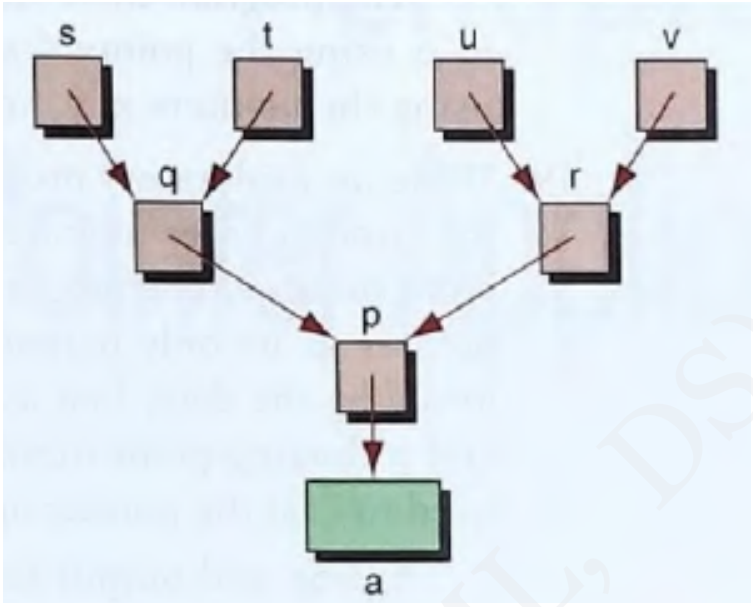
Exercise 5: Sum and Difference

Write a function void update(int *a, int *b) that sets the value of a to their sum and b to their absolute difference.

Sample Test Cases	Input	Output
Test Case 1	Enter the first number, a: 4 Enter the second number, b: 5	a: 9 b: 1
Test Case 2	Enter the first number, a: 7 Enter the second number, b: -3	a: 4 b: 10

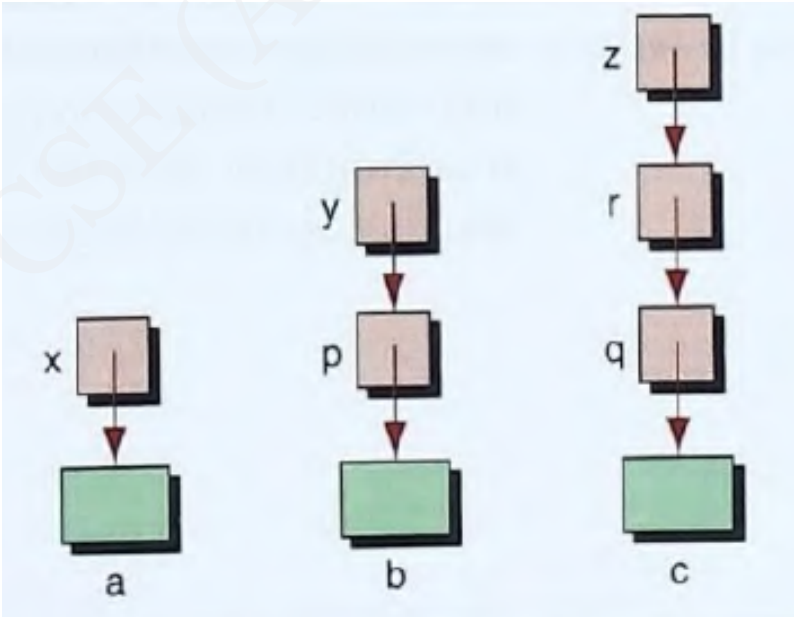
Exercise 6: Pointers to Pointers - I

Write a program that creates the structure shown in the figure given below and then reads an integer into variable a and prints it using each pointer in turn. That is, the program must read an integer into variable a and print it using p,q,r,s,t,u, and v.



Exercise 7: Pointers to Pointers - II

Write a program that creates the structure shown below and reads data into a and b using pointers x and y. The program then multiplies the value of a by b and stores the result in c using pointers x,y, and z. Finally, it prints all three variables using pointers x,y, and z.



Exercise 8: Array Sum using Pointers

Write a function int array_sum(int *arr, int count) that takes an array of integers and the count as arguments and returns their sum.

Sample Test Cases	Input	Output
Test Case 1	Enter no. of elements: 5 Enter the numbers: 1 2 3 4 5	Sum: 15
Test Case 2	Enter no. of elements: -5	Number of elements cant be negative.

Exercise 9: Value Count

Write a function that counts the number of occurrences of a specific value in an array of integers using pointers.

Sample Test Cases	Input	Output
Test Case 1	Enter no. of elements: 8 Enter the numbers: 1 2 4 3 4 1 5 1 Enter the value: 1	Value count : 3
Test Case 2	Enter no. of elements: 8 Enter the numbers: 1 2 4 3 4 1 5 1 Enter the value: 6	Value count : 0

Exercise 10: **Change Breakdown**

Write a function that receives a floating point number representing the change from a purchase. The function will pass back the breakdown of the change in dollar bills, half dollars, quarters, dimes, nickels, and pennies.

Sample Test Cases	Input	Output
Test Case 1	Enter the change: 10.93	Dollars: 10 Half Dollars: 1 Quarters: 1 Dimes: 1 Nickels: 1 Pennies: 2
Test Case 2	Enter the change: -10.93	Invalid Input. Change cannot be negative.

Extra Problems

1. Divisible Sum Pairs
   https://www.hackerrank.com/challenges/divisible-sum-pairs/problem
2. Ice Cream Parlor
   https://www.hackerrank.com/challenges/icecream-parlor/problem

***Textbook :** B. A. Forouzan and R. F. Gilberg —Cengage Learning , Computer Science: A Structured Programming Approach Using C‖ Third Edition.