



Practice Questions

Programming Fundamentals (National University of Computer and Emerging Sciences)

QUESTION#1

Write a program to find the greatest of three numbers.

QUESTION#2

Eureka Lumber Company gives a 2% discount if the remaining balance is paid within 10 days of purchase. Write a program to verify whether a customer qualifies for this discount or not and make the computations accordingly. Use the following variable names:

days: number of days taken to pay the remaining balance

quantity: number of items purchased.

pricePerItem: price of each item purchased.

QUESTION#3

The marks obtained by a student in 5 different subjects are input through the keyboard. The student gets a division as per the following rules:

Percentage above or equal to 60 First division

Percentage between 50 and 59 Second division

Percentage between 40 and 49 Third division

Percentage less than 40 Fail

Write a program to solve the problem.

QUESTION#4

An admission charge for The Little Rep Theater varies according to the age of the person. Develop a solution to print the ticket charge given the age of the person. The charges are as follows:

a. Over 55: PKR 10.00

b. 21–54: PKR 15.00

c. 13–20: PKR 10.00

d. 3–12: PKR 5.00

e. Under 3: Free

QUESTION#5

A hotel has a pricing policy as follows:

- a. 2 people: \$85
- b. 3 people: \$90
- c. 4 people: \$95
- d. Additional people: \$6 per person

If the customer is staying on company business, there is a 20% discount. If the customer is over 60 years of age, there is a 15% discount. A customer does not receive both discounts. Given the above data, print the cost of the room.

QUESTION#6

A manufacturer would like to have a device for a car that will turn on a light when the temperature is between 34 and 40 degrees Fahrenheit (F) and sound a warning signal when the outside temperature is 34 degrees F or below. The light and the sound are never going simultaneously. Write a solution to this problem.

QUESTION#7

In a company, worker efficiency is determined on the basis of the time required for a worker to complete a particular job. If the time taken by the worker is between 2 – 3 hours, then the worker is said to be highly efficient. If the time required by the worker is between 3 – 4 hours, then the worker is ordered to improve speed. If the time taken is between 4 – 5 hours, the worker is given training to improve his speed, and if the time taken by the worker is more than 5 hours, then the worker has to leave the company. If the time taken by the worker is input through the keyboard, find the efficiency of the worker.

QUESTION#8

Write a program, which classify students based on number of credits:

- freshman<5
- sophomore 5-9
- junior 10-14
- senior>14

QUESTION#9

Write if statements to do the following:

- If character variable taxCode is 'T', increase price by adding the taxRate percentage of price to it.
- If integer variable opCode has the value 1, read values for X and Y and calculate and print their sum.
- If integer variable currentNumber is odd, change its value so that it is now 3 times currentNumber plus 1 otherwise change its value so that it is now half of currentNumber.
- Assign true or 1 to the boolean variable leapYear if the integer variable year is a leap year. (A leap year is a multiple of 4, and if it is a multiple of 100, it must also be a multiple of 400.)

QUESTION#10

Write a program to check data using the following criteria. The data are assumed correct when

- a. Number is less than 1000
- b. Number is positive.
- c. Number is divisible by 2.

QUESTION#11

A hotel has a pricing policy as follows:

- a. 2 people: \$85
- b. 3 people: \$90
- c. 4 people: \$95
- d. Additional people: \$6 per person

If the customer is staying on company business, there is a 20% discount. If the customer is over 60 years of age, there is a 15% discount. A customer does not

receive both discounts. Given the above data, write a program to print the cost of the room. Write a program to implement this.

QUESTION#12

The Last Stop Boutique is having a five-day sale. Each day, starting on Monday, the price will drop 10% of the previous day's price. For example, if the original price of a product is \$20.00, the sale price on Monday would be \$18.00 (10% less than the original price). On Tuesday the sale price would be \$16.20 (10% less than Monday). On Wednesday the sale price would be \$14.58; on Thursday the sale price would be \$13.12; and on Friday the sale price would be \$11.81. Write a program that will calculate the price of an item for each of the five days, given the original price. Test the solution for an item costing \$10.00.

QUESTION#13

Write a program that will calculate the average temperature, given a set of temperatures. The number of temperatures may differ from time to time. (Use a trip value to stop the processing of the loop.) Test the solution with the following

10 temperatures:

78° 90°

85° 80°

87° 83°

75° 90°

86° 70°

QUESTION#14

Write a program to test whether a given number is prime or not.

QUESTION#15

Write a program to reverse the digits of a number such that 1234 becomes 4321.

QUESTION#16

Find the reverse of the number and check both the input number and its reverse is equal or not (using for loop).

QUESTION#17

Mr. Brown has given a test to his class. He would like to have the average score for the class as well as the highest and lowest scores. Develop a program to calculate and print out these values. (Use a trip value to stop the processing of the loop.)

QUESTION#18

A company that issues check-cashing cards uses a software to create card numbers. The software adds the digits of a four-digit number, and then adds a fifth digit of 0 or 1 to make the sum of the digits even. The last digit in the number is called the check digit. Write a program that accepts a four-digit number into one variable, adds the check digit, and prints the original number and the new number. Examples: Original number = 4737 (47371) and 4631 (46310).

QUESTION#19

Develop a C program that will determine if a department store customer has exceeded the credit limit on a charge account. For a customer, the following facts are available:

- a) Account number
- b) Balance at the beginning of the month
- c) Total of all items charged by this customer this month
- d) Total of all credits applied to this customer's account this month
- e) Allowed credit limit

The program should input each fact, calculate the new balance = (beginning balance + charges – credits), and determine whether the new balance exceeds the customer's credit limit. For the customer whose credit limit is exceeded, the program should display the customer's account number, credit limit, new balance and the message "Credit limit exceeded." The program should continue above mentioned process until the user enters -1. Following are the sample input/output dialogs:

Enter account number (-1 to end): 100

Enter beginning balance: 5394.78

Enter total charges: 1000.00

Enter total credits: 500.00

Enter credit limit: 5500.00

Account: 100

Credit limit: 5500.00

Balance: 5894.78

Credit Limit Exceeded.

Enter account number (-1 to end): 200

Enter beginning balance: 1000.00

Enter total charges: 123.45

Enter total credits: 321.00

Enter credit limit: 1500.00

Enter account number (-1 to end): -1

QUESTION#20

One large chemical company pays its salespeople on a commission basis. The salespeople receive \$200 per week plus 9% of their gross sales for that week. For example, a salesperson who sells \$5000 worth of chemicals in a week receives \$200 plus 9% of \$5000, or a total of \$650. Develop a program that will input each salesperson's gross sales for last week and will calculate and display that salesperson's earnings. Process one salesperson's figures at a time until -1 is entered. Here is a sample input/output dialog:

Enter sales in dollars (-1 to end): 1234.56

Salary is: \$311.11

Enter sales in dollars (-1 to end): -1

Q21:

Write a `switch` statement to select an operation based on the value of `inventory`. Increment `total_paper` by `paper_order` if `inventory` is 'B' or 'C'; increment `total_ribbon` by `ribbon_order` if `inventory` is 'E', 'F', or 'D'; increment `total_label` by `label_order` if `inventory` is 'A' or 'X'. Do nothing if `inventory` is 'M'. Display an error message if the value of `inventory` is not one of these eight letters.

Q22

Write a `for` loop that sums the even-numbered elements (elements 0, 2, and 4) from array `list`.

Array list

`list[0]list[1]list[2]list[3]list[4]list[5]`

30	12	51	17	45	62
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Q23

Write a do-while loop that repeatedly prompts for and takes input until a value in the range 0 through 15 inclusive is input. Include code that prevents the loop from executing forever on input of a wrong data type.

Q24

Write a program in "SUM.C" which reads two integers and prints out the sum, the difference and the product. Divide them too, printing your answer to two decimal places. Also print the remainder after the two numbers are divided.

Introduce a test to ensure that when dividing the numbers, the second number is not zero.

A problem occurs when dividing the two integers since an answer to two decimal places is required, but dividing two integers yields an integer. The solution is to cast one or other (or both) of the integers to a double, so that double precision division is performed. The minor problem of how to print "%" is overcome by placing "%%" within the string.

(Note: - Double precision means number after the decimal point should be two e.g. If we divide 10/3 it will produce 3.33333... So here our job is to print out up to two precision i.e 3.33).

Q25. Using nested automatic counter loop to print half pyramid using numbers.

Q26. Using nested automatic counter loop to print half pyramid using alphabets.

Q27. Using nested automatic counter loop to print inverted half pyramid using *.

Q28. Using nested automatic counter loop to print full pyramid using *.

Q29. Write a program to print out all Armstrong numbers between 1 and 500. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number. For example, $153 = (1 * 1 * 1) + (5 * 5 * 5) + (3 * 3 * 3)$.

Q30. Write a program to find the range of a set of numbers. Range is the difference between the smallest and biggest number in the list.

Q31. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs. 12.00 per hour for every hour worked above 40 hours. Assume that employees do not work for fractional part of an hour.

Q32. Write a program to count the no of digits in an integer.

33. Write a C program to read and print elements of array.

34. Write a C program to find sum of all array elements.

35. Write a C program to find maximum and minimum element in an array.

36. Write a C program to find second largest element in an array.

37. Write a C program to copy all elements from an array to another array.

38. Write a C program to insert an element in an array.

39. Write a C program to delete an element from an array at specified position.

40. Write a C program to print all unique elements in the array.

41. Write a C program to print all negative elements in an array.

42. Write a C program to count total number of even and odd elements in an array.

43. Write a C program to count total number of negative elements in an array.

44. Write a C program to count total number of duplicate elements in an array.

45. Write a C program to delete all duplicate elements from an array.

46. Write a C program to count frequency of each element in an array.
47. Write a C program to merge two array to third array.
48. Write a C program to find reverse of an array.
49. Write a C program to put even and odd elements of array in two separate array.
50. Write a C program to search an element in an array.
51. Write a C program to sort array elements in ascending order.
52. Write a C program to sort array elements in descending order.
53. Write a C program to sort even and odd elements of array separately.

54:- Write a program to swap two variables without using third variable.

55:- Write a program to find the multiplication of two numbers by successive addition.

(Hint: - 3×2 is same as $2+2+2$).

56:- Write a program that takes values for m and n as input and displays the values of the Pythagorean triple.

(Note: - A "Pythagorean Triple" is a set of positive [integers](#), a, b and c that fits the rule: $a^2 + b^2 = c^2$)

(Hint: - The smallest possible Pythagorean triple is $3^2 + 4^2 = 5^2$).

57:- Program to convert temperature from degree centigrade to Fahrenheit.

(Note: - $^{\circ}\text{C} \times 9/5 + 32 = ^{\circ}\text{F}$)

58:- Find attached image.

2.32 (Body Mass Index Calculator) We introduced the body mass index (BMI) calculator in Exercise 1.14. The formulas for calculating BMI are

$$BMI = \frac{weightInPounds \times 703}{heightInInches \times heightInInches}$$

or

$$BMI = \frac{weightInKilograms}{heightInMeters \times heightInMeters}$$

Create a BMI calculator application that reads the user's weight in pounds and height in inches (or, if you prefer, the user's weight in kilograms and height in meters), then calculates and displays the user's body mass index. Also, the application should display the following information from the Department of Health and Human Services/National Institutes of Health so the user can evaluate his/her BMI:

59:- Write a program to calculate the simple interest where amount of principal interest, rate and time of year are to be taken as input from user.

60- Write a program to sort three numbers in ascending order using only if and else.

(Like: - User Input: 8, 10, 9 Program Output 8, 9, 10).

61:- Find attached image.

Metro City Planners proposes that a community conserve its water supply by replacing all the community's toilets with low-flush models that use only 2 liters per flush. Assume that there is about 1 toilet for every 3 persons, that existing toilets use an average of 15 liters per flush, that a toilet is flushed on average 14 times per day, and that the cost to install each new toilet is \$150. Write a program that would estimate the magnitude (liters/day) and cost of the water saved based on the community's population.

62:- TAXICABNUMBERS_____

Ramanujan Number is the smallest number expressible as the sum of two cubes in two different ways. The two different ways are these:

$$1729 = 1^3 + 12^3 = 9^3 + 10^3$$

The second such number is $2^3 + 16^3 = 9^3 + 15^3 = 4104$. Sequences of such numbers are called Taxicab numbers.

Your task, if you wish to accept it, is to write a program to find first n taxicab numbers (provided n > 0).

INTRO TO FUNCTIONS

NOTE: Use pointers to solve the following problems. Make a separate function to perform individual tasks. Use dynamic memory management for pointers.

QUESTION#1

Write a function named Sum_Num(float* , int) which receives a float array and its size and returns the sum of numbers in the array. Call this function from main. Use appropriate parameters and return type.

QUESTION#2

Write a program to find the max of an integral data set. The program will ask the user to input the number of data values in the set and each value. The program prints on screen a pointer that points to the max value.

QUESTION#3

Write a function called `letter_grade` that has a type `int` input parameter called `points` and returns through an output parameter `grade` the appropriate letter grade using a straight scale (90–100 is an A, 80–89 is a B, and so on). Return through a second output parameter (`just_missed`) an indication of whether the student just missed the next higher grade (true for 89, 79, and so on).

QUESTION#4

Write a program to swap two variables by passing the reference of these variables into a function declared as `void swap(int *, int *)`.

QUESTION#5

Write a program containing three functions named 'Input_Matrix', 'Transpose_Matrix' and 'Display_Transpose' to enter, calculate and display the transpose of a two dimensional matrix. The dimensions of the matrix must be taken as input. Use appropriate parameters and return type for each function. The main function must call all the functions.

QUESTION#6

Write a single function that receives an array of 5 integers and returns the sum, average and standard deviation of these numbers without using return statement. Call this function from `main()` and print the results in `main()`.

Where x represents each value in the population, μ is the mean value of the population, Σ is the summation (or total), and N is the number of values in the population.

QUESTION#7

Write a program to print the reverse of an entered array. Your program must contain only one array.

QUESTION#8

Write a program to copy the content of one array into another in reverse order.

QUESTION#9

Write a program that takes input in two 2-D array and add these two matrices and give addition of these two matrices in 3rd matrix.

QUESTION#10

Write a function named Sum_Num(int* , int) which receives a float array and it's size and returns the sum of even numbers in the array. Call this function from main. Use appropriate parameters and return type.

QUESTION#11

Write a program to dispense change. The user enters the amount paid and the amount due. The program determines how many dollars, quarters, dimes, nickels, and pennies should be given as change. Write a function with four output parameters that determines the quantity of each kind of coin.

QUESTION#12

Determine the following information about each value in a list of positive integers.

- a. Is the value a multiple of 7, 11, or 13?
- b. Is the sum of the digits odd or even?
- c. Is the value a prime number?

You should write a function with three type int output parameters that send back the answers to these three questions. Some sample input data might be:

104 3773 13 121 77 30751

QUESTION#13

Write a program to model a simple calculator. Each data line should consist of the next operation to be performed from the list below and the right operand. Assume the left operand is the accumulator value (initial value of 0). You need a function scan_data with two output parameters that returns the operator and right operand scanned from a data line. You need a function do_next_op that performs the required operation. do_next_op has two input parameters (the operator and operand) and one input/output parameter (the accumulator).

The valid operators are:

⊕ + add

- subtract

* multiply

/ divide

^ power (raise left operand to power of right operand)

q quit

Your calculator should display the accumulator value after each operation. A sample run follows.

+ 5.0

result so far is 5.0

^ 2

result so far is 25.0

/ 2.0

result so far is 12.5

q 0

final result is 12.5

Again FUNCTIONS

QUESTION#1

Four track stars have entered the mile race at the Penn Relays. Write a program that scans in the race time in minutes (minutes) and seconds (seconds) for a runner and computes and displays the speed in feet per second (fps) and in meters per second (mps). (Hints: There are 5,280 feet in one mile, and one

kilometer equals 3,282 feet .) Write and call a function that displays instructions to the program user. Run the program for each star's data.

Minutes	Seconds
=====	=====
3	52.83
3	59.83
4	00.03
4	16.22

QUESTION#2

In shopping for a new house, you must consider several factors. In this problem the initial cost of the house, the estimated annual fuel costs, and the annual tax rate are available. Write a program that will determine the total cost of a house after a five-year period and run the program for each of the following sets of data.

Initial HouseCost	Annual FuelCost	TaxRate
=====	=====	=====
67,000	2,300	0.025
62,000	2,500	0.025
75,000	1,850	0.020

To calculate the house cost, add the initial cost to the fuel cost for five years, then add the taxes for five years. Taxes for one year are computed by multiplying the tax rate by the initial cost. Write and call a function that displays instructions to the program user.

QUESTION#3

A cyclist coasting on a level road slows from a speed of 10 mi/hr to 2.5 mi/hr in one minute. Write a computer program that calculates the cyclist's constant rate of acceleration and determines how long the cyclist will take to come to rest, given an initial speed of 10 mi/hr. (Hint: Use the equation

$$a = \frac{v_f - v_i}{t}$$

where a is acceleration, t is time interval, v_i is initial velocity, and v_f is final velocity.) Write and call a function that displays instructions to the program user and a function that computes a, given t, v_f , and v_i .

QUESTION#4

Write a program which takes 10 numbers input in an array finds the range, mean, median, mode, variance and standard deviation of 10 numbers by function.

QUESTION#5

Write a program containing a function named 'DecToBin' that computes and returns the binary equivalent of entered decimal number being passed as argument to this function. The program must continue to take input and displaying the result until the user quits. Use appropriate parameters and return type.

QUESTION#6

Modify the program in Q#5 for Binary to decimal conversion. Name the function as 'BinToDec'

QUESTION#7

Write a program for Pizzapoint which have a number of delivery boys each with an id between 1-

10. When he finished delivering for a day, he enters his id and sales amount. Then a summary should be printed with one line per delivery boy showing total sales amount. Moreover a commission for each delivery boy is calculated in such a way:

Sales amount below 50,000 10% of sales amount

Sales amount above 50,000 10% of sales amount below 50,000 + 15% of the amount exceeding 50,000

The printout will then be:

Number	Amount	Commission
2	13000	1300
5	60000	6500
4	500	50
8	70000	8000

pass array to function approach to print the output. (Hint array subscript is the id of the delivery boy)

QUESTION#8

A small airline has just purchased a computer for its new automated reservations system. The president has asked you to program the new system. You'll write a program to assign seats on each flight of the airline's only plane (capacity: 10 seats). Your program should display the following menu of alternatives:

Please type 1 for "first class" Please type 2 for "economy"

If the person types 1, then your program should assign a seat in the first class section (seats 1–5). If the person types 2, then your program should assign a seat in the economy section (seats 6–10).

Your program should then print a boarding pass indicating the person's seat number and whether it's in the first class or economy section of the plane.

Use a single-subscripted array to represent the seating chart of the plane. Initialize all the elements of the array to 0 to indicate that all seats are empty. As

each seat is assigned, set the corresponding element of the array to 1 to indicate that the seat is no longer available.

Q9)

5.15 (Hypotenuse Calculations) Define a function called `hypotenuse` that calculates the length of the hypotenuse of a right triangle when the other two sides are given. The function should take two arguments of type `double` and return the hypotenuse as a `double`. Test your program with the side values specified in Fig. 5.22.

Triangle	Side 1	Side 2
1	3.0	4.0
2	5.0	12.0
3	8.0	15.0

Fig. 5.22 | Sample triangle side values for Exercise 5.15.

2D ARRAY AND POINTERS:

Q1. Input values into a 2 dimensional array of stud_ marks for 4 subjects for 5 students and display the summary at the end showing student _id marks of individual subjects , total marks and percentage . in the form:

Id	English	urdu	maths	Total	Percentage
1	50	60	90	200	66
2	60	100	100	260	86
.
.
.

Q2. Write a program to print a diagonal matrix with zeros on its diagonal s, 1 on all positions above diagonal and -1 to all positions below diagonal using 2 dimensional arrays.

Q3. Initialize a 2 dimensional array for student expense list for seven days for 5 students sharing a room. Display the expense list and a cumulative total expense fooreach student as

Student no.	Expenses							Total expense
=====	Day1	Day2	Day3	day4	Day5	Day6	Day7	=====
1	24	23	19	17	16	15	24	200
2	29	34	11	34	17	18	19	620
3	67	21	11	23	22	12	10	100
4	56	33	44	22	11	0	0	170
5	54	55	23	87	11	0	22	290
==	==	==	==	==	==	==	==	
Per day total:	560	500	690	270	290	320	500	
Weekly expense: 5000								

Q4: Find Largest Element Using Dynamic Memory Allocation - calloc().

Q5: Write a program that ask user to enter a choice between 0 and 2 to do different tasks. 0 for add, 1 for subtract and 2 for multiply. Use arrays of function pointer to work on this problem. Like:

```
void (*fun_ptr_arr[])(int, int) = {add, subtract, multiply};
```

Q6: Write a program that gets 5 numbers from the users into a 1D dynamic array. Sort the numbers through user defined functions. Your function prototype must accept and return pointer.

Q. Create menu driven program to perform the following operations for simply 1-D array.

1. Add an element in an array at user specified position.
2. Delete an element from an array.
3. Search an element from an Array.

STRUCTURES and Memory Allocation

Q1- C program Define Cricket Structure and print team wise list.

Variables to be taken:

Player_Name, Team_Name and avg_score_player

Function to be declare:

Search_team_wise()

Q2- Write a program that gets 5 numbers from the users into a 1D dynamic array. Sort the numbers through user defined functions. Your function prototype must accept and return pointer.

Q3- C program define structure of an employee and print department wise.

Variables to be taken:

Emp_ID, Emp_Name and Emp_Depart

Function to be declare:

Search_department_wise()

Q4- Write a C program to calculate the average of a set of N numbers using malloc (memory allocation).

Q5- Write a program that takes the following information about the N employees using structures.

Name , Address , Contact , EmailID

Create an array of structurePrint this information along with memory addresses.

Q6- Write a program that have structure called student that have variables marks, percentage and a variable of structure type, which have detail of student name, father name and roll number. Take input then pass it into function and then print it.

Q7- Define a struct type with the name Length that represents a length in yards, feet, and inches. Define an add() function that will add two Length arguments and return the sum as type Length. Define a second function, show(), that will display the value of its Length argument. Write a program that will use the Length type and the add() and show() functions to sum an arbitrary

number of lengths in yards, feet, and inches that are entered from the keyboard and output the total length.

Make sure do not be dependent upon the only practice questions you should cover all the related material – either we covered in lab/class.

THE END – BEST OF LUCK