Practice Problems

Problem Analysis using Operators with Flow-charts

1. Write a c program to calculate the sum of two numbers.
2. Write a c program to calculate the average of three numbers.
3. Write a c program to calculate the area of a triangle using 1/2 * base * height.
4. Write a c program to calculate the area of a triangle using three sides.
5. Write a c program to calculate the area of a rectangle.
6. Write a c program to calculate the area of a circle.
7. Write a c program to convert Celsius temperature to Fahrenheit temperature.
8. Write a c program to convert Fahrenheit temperature to Celsius temperature.
9. Write a c program to swap two numbers.
10. Write a c program to ceil, round, and floor a floating-point number.

Reference Book: Programming in ANSI C, Balagurusamy (4th Edition)

- **Chapter 3: Operators and Expressions**
    - Case Studies: 1, 2
    - Exercises: 3.1, 3.11, 3.13, 3.14, 3.16

Practice Problems

Problem Analysis using Conditionals with Flow-charts

1. How does the if-else statement work?
2. Write a c program to check whether a number is even or odd.
3. Write a c program to check whether a number is positive or negative or equal to zero.
4. Write a c program to find the largest between two numbers.
5. Write a c program to find the smallest among three numbers.
6. Write a c program to check whether a year is a leap year or not.
7. Write a c program to check whether a student has passed (40%) or failed from a given mark.
8. Write a c program to calculate the grade points of a student for a particular subject from the given mark using the following table:

90% and above	80% to below 90%	70% to below 80%	60% to below 70%	50% to below 60%	Below 50%
4.0	3.5	3.0	2.5	2.0	0

9. Write a c program to check whether a character is a capital letter or a small letter or others.
10. Write a c program to check whether a character is a vowel or consonant or digit or white space or special character.
11. How does the switch statement work?
12. Write a c program to spell a digit using switch.
13. Write a c program to check whether a character is a vowel or consonant using switch.
14. Write a c program to implement a calculator (+, -, *, /, %) using switch.
15. Write a c program to implement a menu-based temperature conversion using switch.

Reference Book: Programming in ANSI C, Balagurusamy (4th Edition)

- **Chapter 5: Decision Making and Branching**
    - Examples: 5.5, 5.6, 5.7
    - Case Studies: 2
    - Exercises: 5.3, 5.5, 5.8, 5.10, 5.11, 5.12, 5.15

Practice Problems

Problem Analysis using Loops with Flow-charts

1. Answer the following questions with appropriate examples and flowcharts:
    a. How does a for loop work?
    b. How does a while loop work?
    c. How does a do-while loop work?
    d. How does the goto statement work?
    e. How does the break statement work?
    f. How does the continue statement work?
2. Write a c program to print the sum of the following series:
    a. $1 + 2 + 3 + ... + N$
    b. $1^2 + 3^2 + 5^2 + ... + N^2$
    c. $2^2 * 4^2 * 6^2 * .... * N^2$
    d. $1 + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{N}$
    e. $1 - 2 + 3 - 4 + 5 - 6 + ... + N$
    f. $1 * 2 + 2 * 3 + 3 * 4 + ... + n1 * n2$
    g. $1 * 3 * 4 + 2 * 5 * 6 + 3 * 7 * 8 + ... + n1 * n2 * n3$
    h. $1 + 5 + 9 + ... + Nth\ number$
    i. $1 + 2 + 4 + 5 + 7 + 8 + ... + N$
    j. $60 + 57 + 54 + ... \geq 1$
3. Write a c program to calculate the sum of the Fibonacci series upto N-th term:
    $0 + 1 + 1 + 2 + 3 + 5 + 8 + ... + Nth\ term$
4. Write a c program to calculate the factorial of a number.
5. Write a c program to calculate the GCD and LCM of two numbers.
6. Write a c program to check whether a number is prime or not.
7. Write a c program to print the prime numbers within a range.
8. Write a c program to count the number of digits of a number.
9. Write a c program to calculate the sum of digits of a number.
10. Write a c program to reverse a number.
11. Write a c program to check whether a number is a palindrome or not.

Practice Problems

12. Write a c program to print the palindrome numbers within a range.
13. Write a c program to check whether a number is an Armstrong number or not.
14. Write a c program to print the Armstrong numbers within a range.
15. Write a c program to check whether a number is a Strong number or not.

Reference Book: Programming in ANSI C, Balagurusamy (4th Edition)

- **Chapter 6: Decision Making and Looping**
    - Examples: 6.2
    - Case Studies: 3
    - Exercises: 6.11, 6.18, 6.20
- **Chapter 5: Decision Making and Branching**
    - Case Studies: 1
    - Exercises: 5.4

Practice Problems

Problem Analysis using Arrays

1. Write a c program to calculate the sum and average of an array.
2. Write a c program to find both values and indexes of maximum and minimum elements of an array.
3. Write a c program to search a number in an array. It will print the index of the element, if it is found. Otherwise, it will print "Not found."
4. Write a c program to count the frequency of a number in an array.
5. Write a c program to copy an array to another array.
6. Write a c program to reverse an array.
7. Write a c program to sort an array.
8. Write a c program to calculate the sum and average of a 2D array.
9. Write a c program to find both values and indexes of maximum and minimum elements of a 2D array.
10. Write a c program to calculate the sum of diagonal elements of a matrix.
11. Write a c program to multiply a matrix by a factor.
12. Write a c program to transpose a matrix, i.e., A'. Given, A = {{1, 2}, {2, 4}}.
13. Write a c program to add two matrices. If A and B are two matrices, the sum of these matrices, C = A + B.
14. Write a c program to subtract two matrices. If A and B are two matrices, the difference of these matrices, C = A - B.
15. Write a c program to multiply two matrices. If A and B are two matrices, the product of these matrices, C = A * B. Given, A={{1, 2}, {1, 2}} and B = {{2, 1}, {2, 1}}.

Practice Problems

Problem Analysis using Strings

1. Write a c program to search for a character in a string. It will print the index of the element, if it is found. Otherwise, it will print “Not found.”
2. Write a c program to count the frequency of a character in a string.
3. Write a c program to count the number of capital letters and small letters in a string.
4. Write a c program to count the number of vowels, consonants, digits, white-spaces, and special characters.
5. Write a c program to count alphanumeric characters in a string. Note that alphanumeric characters are a combination of alphabetic and numeric characters. Your program will print 8 for this string "<html></html>".
6. Write a c program to calculate the length of a string.
7. Write a c program to add three strings.
8. Write a c program to copy a string to another string.
9. Write a c program to reverse a string.
10. Write a c program to check whether a string is a palindrome or not.

Practice Problems

Problem Analysis using Functions

1. How does function work?
2. Write a c function that takes two numbers as parameters and returns the sum of them.
3. Write a c function that takes a year as a parameter and returns 1 if it is a leap year, otherwise, it returns 0. It will return 1 for 2000 and 0 for 2100.
4. Write a c function that takes mark of a subject as parameter and returns obtained grade using the following table:

90% and above	80% to below 90%	70% to below 80%	60% to below 70%	50% to below 60%	Below 50%
4.0	3.5	3.0	2.5	2.0	0

5. Write a c function that takes a number as a parameter and returns 1 if it is prime, otherwise, it returns 0. It prints 1 for 23 and 0 for 22.
6. Write a c function that takes an array as a parameter and returns the average of that array.
7. Write a c function to check whether a string is a palindrome or not. It returns 1 if given string is a palindrome, otherwise, it returns 0. A string is called palindrome if the reverse of the string is the same as the original string, i.e., madam. You can use library functions.
8. Write a c function to calculate the factorial of a number using recursion.
9. Write a c function to calculate the sum of the multiples of 7 within 1 to 100, i.e., 7+14+21+...+98, using recursion. It will print 735.
10. Write a c function to swap two numbers using pointer.