C Programming Exercises Solutions

1 Memory Measurement Units

Bit, Byte, Kilobyte, Megabyte, Gigabyte, Terabyte, Petabyte, Exabyte

2 C Keywords

auto, break, case, char, const, continue, default, do, double, else, enum, extern, float, for, goto, if, int, long, register, return, short, signed, sizeof, static, struct, switch, typedef, union, unsigned, void, volatile, while

3 Net Salary Calculation

```c
#include <stdio.h>
int main() {
    float salary, allowances, deductions, net_salary;
    printf("Enter salary, allowances, deductions: ");
    scanf("%f %f %f", &salary, &allowances, &deductions);
    net_salary = salary + allowances - deductions;
    printf("Net Salary: %.2f\n", net_salary);
    return 0;
}
```

4 Total Amount Calculation

```c
#include <stdio.h>
int main() {
    float cost, quantity, total_amount;
    printf("Enter cost and quantity: ");
    scanf("%f %f", &cost, &quantity);
    total_amount = cost * quantity;
    printf("Total Amount: %.2f\n", total_amount);
    return 0;
}
```

5 Discounted Amount Calculation

```c
#include <stdio.h>
int main() {
    float cost, quantity, total_amount, discount, net_amount;
    printf("Enter cost and quantity: ");
    scanf("%f %f", &cost, &quantity);
    total_amount = cost * quantity;
    discount = total_amount * 10 / 100;
    net_amount = total_amount - discount;
    printf("Total Amount: %.2f\n", total_amount);
    printf("Discount: %.2f\n", discount);
    printf("Net Amount: %.2f\n", net_amount);
    return 0;
}
```

6 Variable Range Overflow

Assigning a value beyond a variable's data type range causes overflow or undefined behavior. For example, an int (typically 32-bit) ranges from -2,147,483,648 to 2,147,483,647. Exceeding this may wrap around or result in undefined behavior.

7 Biggest of Three Numbers

```c
#include <stdio.h>
int main() {
    int a, b, c, big;
    printf("Enter three numbers: ");
    scanf("%d %d %d", &a, &b, &c);
    big = (a > b && a > c) ? a : (b > c) ? b : c;
    printf("Biggest: %d\n", big);
    return 0;
}
```

8 Smallest of Three Numbers

```c
#include <stdio.h>
int main() {
    int a, b, c, small;
    printf("Enter three numbers: ");
    scanf("%d %d %d", &a, &b, &c);
    small = (a < b && a < c) ? a : (b < c) ? b : c;
    printf("Smallest: %d\n", small);
    return 0;
}
```

9 Biggest of Three Outputs

For the expression `big = (a > b && a > c) ? a : (b > c) ? b : c;`, the outputs are:

- 10, 30, 50 → 3rd value (50)
- 10, 40, 40 → 3rd value (40)
- 40, 10, 40 → 3rd value (40)
- 40, 40, 10 → 2nd value (40)
- 40, 40, 40 → 3rd value (40)

10 Even or Odd Number Methods

```c
#include <stdio.h>
int main() {
    int n;
    printf("Enter a number: ");
    scanf("%d", &n);
    printf("Method 1 (Modulo): %s\n", n % 2 == 0 ? "Even" :
        "Odd");
    printf("Method 2 (Bitwise): %s\n", (n & 1) == 0 ? "Even" :
        "Odd");
    printf("Method 3 (Division): %s\n", (n / 2) * 2 == n ?
        "Even" : "Odd");
    return 0;
}
```

11 Voting Eligibility

```c
#include <stdio.h>
int main() {
    int age;
    printf("Enter age: ");
    scanf("%d", &age);
    printf("%s\n", age >= 18 ? "Eligible to vote" : "Not
        eligible to vote");
    return 0;
}
```

12 Elder of Two Persons

```c
#include <stdio.h>
int main() {
    int age1, age2;
    printf("Enter age of first person: ");
    scanf("%d", &age1);
    printf("Enter age of second person: ");
    scanf("%d", &age2);
    if (age1 > age2)
        printf("First person is elder\n");
    else if (age2 > age1)
        printf("Second person is elder\n");
    else
        printf("Both are of same age\n");
    return 0;
}
```

13 Discount Based on Total Amount

```c
#include <stdio.h>
int main() {
    float cost, qty, total, discount, net;
    printf("Enter cost and quantity: ");
    scanf("%f %f", &cost, &qty);
    total = cost * qty;
    discount = total > 500 ? total * 8 / 100 : total * 3 / 100;
    net = total - discount;
    printf("Net Amount: %.2f\n", net);
    return 0;
}
```

14 Pass or Fail Based on Marks

```c
#include <stdio.h>
int main() {
    int sub1, sub2, sub3;
    printf("Enter marks of three subjects: ");
    scanf("%d %d %d", &sub1, &sub2, &sub3);
    if (sub1 > 35 && (sub2 > 35 || sub3 > 35))
        printf("PASS\n");
    else
        printf("FAIL\n");
    return 0;
}
```

15 Tax Calculation

```c
#include <stdio.h>
int main() {
    float salary;
    int tax;
    printf("Enter salary: ");
    scanf("%f", &salary);
    if (salary >= 50000)
        tax = 3000;
    else if (salary >= 30000)
        tax = 2000;
    else if (salary >= 20000)
        tax = 1000;
    else
        tax = 0;
    printf("Tax to pay: %d\n", tax);
    return 0;
}
```

16 Gender Identification

```c
#include <stdio.h>
int main() {
    char gender;
    printf("Enter gender (M/F): ");
    scanf(" %c", &gender);
    if (gender == 'M' || gender == 'm')
        printf("MALE\n");
    else if (gender == 'F' || gender == 'f')
        printf("FEMALE\n");
    else
        printf("Invalid input\n");
    return 0;
}
```

17 Age Category

```c
#include <stdio.h>
int main() {
    int age;
    printf("Enter age: ");
    scanf("%d", &age);
    if (age >= 0 && age <= 12)
        printf("Kid\n");
    else if (age <= 19)
        printf("Teenager\n");
    else if (age <= 50)
        printf("Young Person\n");
```

```
    else if (age <= 60)
        printf("Middle aged person\n");
    else if (age <= 80)
        printf("Young old person\n");
    else
        printf("Old person\n");
    return 0;
}
```

18 Vowel Check

```
#include <stdio.h>
int main() {
    char ch;
    printf("Enter a character: ");
    scanf(" %c", &ch);
    if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' || ch
       == 'u' ||
        ch == 'A' || ch == 'E' || ch == 'I' || ch == 'O' || ch
           == 'U')
        printf("Vowel\n");
    else
        printf("Not a vowel\n");
    return 0;
}
```

19 Vowel or Consonant

```
#include <stdio.h>
int main() {
    char ch;
    printf("Enter a character: ");
    scanf(" %c", &ch);
    if (ch >= 'a' && ch <= 'z' || ch >= 'A' && ch <= 'Z') {
        if (ch == 'a' || ch == 'e' || ch == 'i' || ch == 'o' ||
           ch == 'u' ||
            ch == 'A' || ch == 'E' || ch == 'I' || ch == 'O' ||
               ch == 'U')
            printf("Vowel\n");
        else
            printf("Consonant\n");
    } else {
        printf("Not a letter\n");
    }
    return 0;
}
```

20 Character Type

```c
#include <stdio.h>
int main() {
    char ch;
    printf("Enter a character: ");
    scanf(" %c", &ch);
    if (ch >= 'A' && ch <= 'Z')
        printf("Uppercase letter\n");
    else if (ch >= 'a' && ch <= 'z')
        printf("Lowercase letter\n");
    else if (ch >= '0' && ch <= '9')
        printf("Digit\n");
    else
        printf("Special character\n");
    return 0;
}
```

21 Three Digit Number Analysis

```c
#include <stdio.h>
int main() {
    int num, first, second, third;
    printf("Enter a 3-digit number: ");
    scanf("%d", &num);
    third = num % 10;
    second = (num / 10) % 10;
    first = num / 100;
    printf("a) First (%d) and Third (%d): %s\n", first, third,
           first > third ? ">" : first < third ? "<" : "=");
    printf("b) Second (%d) and Third (%d): %s\n", second, third,
           second > third ? ">" : second < third ? "<" : "=");
    int big = first > second ? (first > third ? first : third) :
       (second > third ? second : third);
    printf("c) Biggest digit: %d\n", big);
    return 0;
}
```

22 Four Digit Number Sum Comparison

```c
#include <stdio.h>
int main() {
    int num, first_two, last_two;
    printf("Enter a 4-digit number: ");
    scanf("%d", &num);
    first_two = (num / 100) % 10 + num / 1000;
    last_two = (num % 100) / 10 + num % 10;
    printf("Sum of first two (%d) and last two (%d): %s\n",
```

```
            first_two, last_two,
            first_two > last_two ? ">" : first_two < last_two ?
               "<" : "=");
    return 0;
}
```

23 Grade Remarks

```
#include <stdio.h>
int main() {
    char grade;
    printf("Enter grade (A/B/C/D): ");
    scanf(" %c", &grade);
    switch (grade) {
        case 'A': printf("Good\n"); break;
        case 'B': printf("Can do better\n"); break;
        case 'C': printf("Work hard\n"); break;
        case 'D': printf("Poor\n"); break;
        default: printf("Invalid grade\n");
    }
    return 0;
}
```

24 Department Bonus

```
#include <stdio.h>
int main() {
    int dept;
    printf("Enter department ID (10/20/30/40/50/60): ");
    scanf("%d", &dept);
    switch (dept) {
        case 10:
        case 30:
        case 40: printf("Bonus: 5000\n"); break;
        case 20:
        case 60: printf("Bonus: 8000\n"); break;
        case 50: printf("Bonus: 9000\n"); break;
        default: printf("Bonus: 4000\n");
    }
    return 0;
}
```

25 Four Digit Unique Digits

```
#include <stdio.h>
int main() {
```

```
    int num, digits[4], i, j, unique = 1;
    printf("Enter a 4-digit number: ");
    scanf("%d", &num);
    digits[0] = num / 1000;
    digits[1] = (num / 100) % 10;
    digits[2] = (num / 10) % 10;
    digits[3] = num % 10;
    for (i = 0; i < 3; i++)
        for (j = i + 1; j < 4; j++)
            if (digits[i] == digits[j]) unique = 0;
    printf("a) Digits are %s\n", unique ? "Unique" : "Not
       unique");
    printf("b) Contains duplicate: %s\n", unique ? "No" : "Yes");
    return 0;
}
```

26 Five Digit Number Digit Repetitions

```
#include <stdio.h>
int main() {
    int num, digits[10] = {0}, temp;
    printf("Enter a 5-digit number: ");
    scanf("%d", &num);
    temp = num;
    while (temp > 0) {
        digits[temp % 10]++;
        temp /= 10;
    }
    for (int i = 0; i < 10; i++)
        if (digits[i] > 0)
            printf("%d-%d ", i, digits[i]);
    printf("\n");
    return 0;
}
```

27 Series of Values

```
#include <stdio.h>
int main() {
    printf("a) -1 to -5: ");
    for (int i = -1; i >= -5; i--) printf("%d ", i);
    printf("\nReverse: ");
    for (int i = -5; i <= -1; i++) printf("%d ", i);
    printf("\n");
    printf("b) Even numbers 20 to 50: ");
    for (int i = 20; i <= 50; i += 2) printf("%d ", i);
    printf("\n");
    printf("c) Multiples of 5: ");
```

```c
    for (int i = 5; i <= 50; i += 5) printf("%d ", i);
    printf("\n");
    printf("d) -20 to -2 (even): ");
    for (int i = -20; i <= -2; i += 2) printf("%d ", i);
    printf("\n");
    return 0;
}
```

28 Sum of Even Numbers

```c
#include <stdio.h>
int main() {
    int n, sum = 0;
    printf("Enter a number: ");
    scanf("%d", &n);
    for (int i = 2; i <= n; i += 2) sum += i;
    printf("Sum of even numbers: %d\n", sum);
    return 0;
}
```

29 Sum of Odd Numbers Divisible by 3

```c
#include <stdio.h>
int main() {
    int n, sum = 0;
    printf("Enter a number: ");
    scanf("%d", &n);
    for (int i = 3; i <= n; i += 3)
        if (i % 2 != 0) sum += i;
    printf("Sum: %d\n", sum);
    return 0;
}
```

30 Multiplication Tables (x to y)

```c
#include <stdio.h>
int main() {
    int x, y;
    printf("Enter x and y: ");
    scanf("%d %d", &x, &y);
    for (int i = x; i <= y; i++) {
        printf("Table of %d:\n", i);
        for (int j = 1; j <= 10; j++)
            printf("%d x %d = %d\n", i, j, i * j);
    }
    return 0;
}
```

31 Multiplication Tables (y to x)

```c
#include <stdio.h>
int main() {
    int x, y;
    printf("Enter x and y: ");
    scanf("%d %d", &x, &y);
    for (int i = y; i >= x; i--) {
        printf("Table of %d:\n", i);
        for (int j = 1; j <= 10; j++)
            printf("%d x %d = %d\n", i, j, i * j);
    }
    return 0;
}
```

32 K Prime Numbers

```c
#include <stdio.h>
int isPrime(int n) {
    if (n < 2) return 0;
    for (int i = 2; i * i <= n; i++)
        if (n % i == 0) return 0;
    return 1;
}
int main() {
    int k, count = 0, num = 2;
    printf("Enter k: ");
    scanf("%d", &k);
    while (count < k) {
        if (isPrime(num)) {
            printf("%d ", num);
            count++;
        }
        num++;
    }
    printf("\n");
    return 0;
}
```

33 Count Even and Odd Digits

```c
#include <stdio.h>
int main() {
    int num, even = 0, odd = 0, digit;
    printf("Enter a number: ");
    scanf("%d", &num);
    while (num > 0) {
        digit = num % 10;
```

```
        if (digit % 2 == 0) even++;
        else odd++;
        num /= 10;
    }
    printf("No. of Even digits: %d\n", even);
    printf("No. of Odd digits: %d\n", odd);
    return 0;
}
```

34 Sum of Odd Digits Divisible by 3

```
#include <stdio.h>
int main() {
    int num, sum = 0, digit;
    printf("Enter a number: ");
    scanf("%d", &num);
    while (num > 0) {
        digit = num % 10;
        if (digit % 2 != 0 && digit % 3 == 0) sum += digit;
        num /= 10;
    }
    printf("Sum: %d\n", sum);
    return 0;
}
```

35 Sum of Digits at Even Positions

```
#include <stdio.h>
int main() {
    int num, sum = 0, pos = 1;
    printf("Enter a number: ");
    scanf("%d", &num);
    while (num > 0) {
        if (pos % 2 == 0) sum += num % 10;
        num /= 10;
        pos++;
    }
    printf("Sum: %d\n", sum);
    return 0;
}
```

36 Armstrong Number

An Armstrong number is a number equal to the sum of its digits each raised to the power of the number of digits. Examples: 153 ($1^3 + 5^3 + 3^3 = 153$), 370 ($3^3 + 7^3 + 0^3 = 370$), 407 ($4^3 + 0^3 + 7^3 = 407$).

37 Even or Odd Function

```c
#include <stdio.h>
void checkEvenOdd(int num) {
    printf("%d is %s\n", num, num % 2 == 0 ? "Even" : "Odd");
}
int main() {
    int num1, num2;
    printf("Enter two numbers: ");
    scanf("%d %d", &num1, &num2);
    checkEvenOdd(num1);
    checkEvenOdd(num2);
    return 0;
}
```

38 Multiplication Table Function

```c
#include <stdio.h>
void printTable(int num) {
    for (int i = 1; i <= 10; i++)
        printf("%d x %d = %d\n", num, i, num * i);
}
int main() {
    int start, end;
    printf("Enter start and end numbers: ");
    scanf("%d %d", &start, &end);
    for (int i = start; i <= end; i++) {
        printf("Table of %d:\n", i);
        printTable(i);
    }
    return 0;
}
```

39 Recursive Numbers 10 to 1

```c
#include <stdio.h>
void printNumbers(int n) {
    if (n < 1) return;
    printf("%d ", n);
    printNumbers(n - 1);
}
int main() {
    printNumbers(10);
    printf("\n");
    return 0;
}
```

40 Recursive Digit Count

```c
#include <stdio.h>
int countDigits(int n) {
    if (n == 0) return 0;
    return 1 + countDigits(n / 10);
}
int main() {
    int num;
    printf("Enter a number: ");
    scanf("%d", &num);
    printf("Number of digits: %d\n", countDigits(num));
    return 0;
}
```

41 Count Grades

```c
#include <stdio.h>
int main() {
    char grades[10];
    int count[4] = {0}; // A, B, C, D
    printf("Enter grades for 10 persons (A/B/C/D):\n");
    for (int i = 0; i < 10; i++) scanf(" %c", &grades[i]);
    for (int i = 0; i < 10; i++) {
        if (grades[i] == 'A') count[0]++;
        else if (grades[i] == 'B') count[1]++;
        else if (grades[i] == 'C') count[2]++;
        else if (grades[i] == 'D') count[3]++;
    }
    printf("A: %d, B: %d, C: %d, D: %d\n", count[0], count[1],
       count[2], count[3]);
    return 0;
}
```

42 Count Even and Odd Numbers in Array

```c
#include <stdio.h>
int main() {
    int arr[10], even = 0, odd = 0;
    printf("Enter 10 integers:\n");
    for (int i = 0; i < 10; i++) scanf("%d", &arr[i]);
    for (int i = 0; i < 10; i++) {
        if (arr[i] % 2 == 0) even++;
        else odd++;
    }
    printf("Even: %d, Odd: %d\n", even, odd);
    return 0;
}
```

43 Search Key in Array

```c
#include <stdio.h>
int main() {
    int arr[10], key, count = 0;
    printf("Enter 10 integers:\n");
    for (int i = 0; i < 10; i++) scanf("%d", &arr[i]);
    printf("Enter key to search: ");
    scanf("%d", &key);
    for (int i = 0; i < 10; i++)
        if (arr[i] == key) count++;
    printf("Occurrences of %d: %d\n", key, count);
    return 0;
}
```

44 Count Vowels in String

```c
#include <stdio.h>
int main() {
    char str[100];
    int count = 0;
    printf("Enter a string: ");
    scanf(" %[^\n]", str);
    for (int i = 0; str[i] != '\0'; i++) {
        if (str[i] == 'a' || str[i] == 'e' || str[i] == 'i' ||
           str[i] == 'o' || str[i] == 'u' ||
            str[i] == 'A' || str[i] == 'E' || str[i] == 'I' ||
               str[i] == 'O' || str[i] == 'U')
            count++;
    }
    printf("Number of vowels: %d\n", count);
    return 0;
}
```

45 Convert String to Uppercase

```c
#include <stdio.h>
int main() {
    char str[100];
    printf("Enter a string: ");
    scanf(" %[^\n]", str);
    for (int i = 0; str[i] != '\0'; i++)
        if (str[i] >= 'a' && str[i] <= 'z')
            str[i] = str[i] - 32;
    printf("Uppercase: %s\n", str);
    return 0;
}
```

46 Biggest of Three Using Pointers

```c
#include <stdio.h>
int main() {
    int a, b, c, *pa = &a, *pb = &b, *pc = &c, big;
    printf("Enter three numbers: ");
    scanf("%d %d %d", pa, pb, pc);
    big = (*pa > *pb && *pa > *pc) ? *pa : (*pb > *pc) ? *pb :
       *pc;
    printf("Biggest: %d\n", big);
    return 0;
}
```

47 Swap Using Pointers

```c
#include <stdio.h>
void swap(int *a, int *b) {
    int temp = *a;
    *a = *b;
    *b = temp;
}
int main() {
    int a, b;
    printf("Enter two numbers: ");
    scanf("%d %d", &a, &b);
    printf("Before: a=%d, b=%d\n", a, b);
    swap(&a, &b);
    printf("After: a=%d, b=%d\n", a, b);
    return 0;
}
```

48 Book Details Using Pointers to Structures

```c
#include <stdio.h>
struct Book {
    char title[100];
    char author[50];
    int year;
};
int main() {
    struct Book b;
    struct Book *pb = &b;
    printf("Enter title, author, year: ");
    scanf(" %[^\n] %[^\n] %d", pb->title, pb->author, &pb->year);
    printf("Title: %s\nAuthor: %s\nYear: %d\n", pb->title,
       pb->author, pb->year);
    return 0;
}
```