भारतीय सूचना प्रौद्योगिकी संस्थान गुवाहाटी

Indian Institute of Information Technology Guwahati

COMPUTER PROGRAMMING LAB (CS110)
ASSIGNMENTS AND SOLUTIONS–02

[Note: Do not use the `scanf()` function, `if ()` statements or any loop construct.]

1. Write a program in C to initialize a `char` variable as `'a'` and print its ASCII value.

```c
#include <stdio.h>

int main() {
    char var = 'a';
    printf("%d", var);
    return 0;
}
```

2. Write a program in C to find the average of five numbers.

```c
#include <stdio.h>

int main() {
    int n1 = 5, n2 = 6, n3 = 4, n4 = 5, n5 = 8;
    double average = 0;
    average = (n1 + n2 + n3 + n4 + n5) / 5.0; // do not use 5
    printf("Average: %lg\n", average);
    return 0;
}
```

3. Write a program in C to find the area of a circle. The radius of the circle is input.

```c
#include <stdio.h>
#include <math.h>

int main() {
    double radius = 5.0;
    double area = 0.0;
    area = M_PI * radius * radius;
    printf("Area: %lg\n", area);
    return 0;
}
```

4. Write a program in C to find the area of a rectangle. The length and width of the rectangle are inputs.

```c
#include <stdio.h>

int main() {
    double length = 5.0, width = 3.0;
    double area = 0.0;
    area = length * width;
    printf("Area: %lg\n", area);
    return 0;
}
```

5. Write a C program to find the area of a triangle. The lengths of the sides of the triangle are inputs.

```c
#include <stdio.h>
#include <math.h>

int main() {
    double a = 5.0, b = 3.0, c = 4.0;
    double s, area = 0.0;
    s = (a + b + c) / 2.0;
    area = sqrt(s * (s - a) * (s - b) * (s - c));
    printf("Area: %lg\n", area);
    return 0;
}
```

6. Write a program in C to calculate simple interest.

```c
#include <stdio.h>
#include <math.h>

int main() {
    double p = 50000.00, t = 2.0, r = 8.0;
    double interest = 0.0;
    interest = p * t * r / 100.0;
    printf("Interest: %lg\n", interest);
    return 0;
}
```

7. Write a program in C to calculate compound interest.

```c
#include <stdio.h>
#include <math.h>

int main() {
    double p = 50000.00, t = 2.0, r = 8.0;
    double interest = 0.0;
    interest = p * pow((1.0 + r / 100.0), t) - p;
```

```
    printf("Interest: %lg\n", interest);
    return 0;
}
```

8. Write a program in C to solve a quadratic equation. If the equation is $ax^2 + bx + c = 0$, then a, b, and c are inputs.

```
#include <stdio.h>
#include <math.h>

int main() {
    double a = 5.0, b = 6.0, c = 1.0;
    double root_1 = 0.0, root_2 = 0.0;
    root_1 = (- b + sqrt(b * b - 4.0 * a * c)) / (2 * a);
    root_1 = (- b - sqrt(b * b - 4.0 * a * c)) / (2 * a);
    printf("Root 1: %lg\n", root_1);
    printf("Root 2: %lg\n", root_2);
    return 0;
}
```

9. Write a program in C to compute the area of a circle. The circumference of the circle is input. Consider $\pi = 3.14$.

```
#include <stdio.h>

int main() {
    double circumference = 6.28;
    double radius = 0.0, area = 0.0;
    radius = circumference / (2 * 3.14);
    area = 3.14 * radius * radius;
    printf("Area: %lg\n", area);
    return 0;
}
```

10. Given the initial velocity (u), acceleration (a), and the time (t), write a program in C to compute the final velocity of an object.

```
#include <stdio.h>

int main() {
    double u = 3.14, a = 2.13, t = 6.23;
    double v = 0.0 ;
    v = u + a * t;
    printf("Velocity: %lg\n", v);
    return 0;
}
```

11. Given the initial velocity (u), acceleration (a), and the time (t), write a program in C to compute the final displacement of an object.

```c
#include <stdio.h>

int main() {
    double u = 3.14, a = 2.13, t = 6.23;
    double s = 0.0 ;
    s = u *t + 0.5 * a * t * t;
    printf("Displacement: %lg\n", s);
    return 0;
}
```

12. Write a program in C to convert temperature in ${}^oC$ to ${}^oF$.

```c
#include <stdio.h>

int main() {
    double C = 100.0;
    double F = 0.0 ;
    F = 9.0 * C / 5.0 + 32.0;
    printf("F: %lg\n", F);
    return 0;
}
```

13. Write a program in C to convert temperature in ${}^oF$ to ${}^oC$.

```c
#include <stdio.h>

int main() {
    double F = 100.0;
    double C = 0.0 ;
    C = 5.0 * (F - 32.0) / 9.0;
    printf("C: %lg\n", C);
    return 0;
}
```

14. Write a program in C to extract the individual digits of a given number (a positive integer) and add them. Assume the number has at most five digits. Do not use any loop construct.

```c
#include <stdio.h>

int main() {
    int n = 12345;
    int sum = 0;
    sum += n % 10;
    n /= 10;
    sum += n % 10;
    n /= 10;
    sum += n % 10;
    n /= 10;
    sum += n % 10;
```

```
    n /= 10;
    sum += n % 10;
    n /= 10;
    printf("%d\n", sum);
    return 0;
}
```

15. Write a program in C to calculate the product of the digits of a five-digit positive integer. Do not use any loop construct.

```
#include <stdio.h>

int main() {
    int n = 12345;
    int product = 1;
    product *= n % 10;
    n /= 10;
    product *= n % 10;
    n /= 10;
    product *= n % 10;
    n /= 10;
    product *= n % 10;
    n /= 10;
    product *= n % 10;
    n /= 10;
    printf("%d\n", product);
    return 0;
}
```

16. Write a program in C to reverse a five-digit positive integer. For instance, if the number is 13257, the output needs to be 75231. Do not use any loop construct.

```
#include <stdio.h>

int main() {
    int n = 12345;
    int reverse = 0;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    printf("%d\n", reverse);
    return 0;
}
```

17. Write a program in C to check if a five-digit positive integer is palindrome or. For instance, the number is `13531` is a palindrome. Do not use any loop construct. You cannot use any `if ()` statement. If it is a palindrome number, print `Y`. Otherwise, print `N`.

```c
#include <stdio.h>

int main() {
    int n = 12345;
    int reverse = 0, copy = 0;
    copy = n;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    reverse = reverse * 10 + n % 10;
    n /= 10;
    printf("%c\n", reverse == copy ? 'Y' : 'N');
    return 0;
}
```

18. Write a C program to swap two `int` variables using a third variable.

```c
#include <stdio.h>

int main() {
    int a = 1, b = 2;
    int temp = 0;
    temp = a;
    a = b;
    b = temp;
    printf("a = %d, b = %d\n", a, b);
    return 0;
}
```

19. Write a program in C to swap two `int` variables without using a third variable.

```c
#include <stdio.h>

int main() {
    int a = 1, b = 2;
    a ^= b;
    b ^= a;
    a ^= b;
    printf("a = %d, b = %d\n", a, b);
    a += b;
```

```
    b = a - b;
    a -= b;
    printf("a = %d, b = %d\n", a, b);
    a *= b;
    b = a / b;
    a /= b;
    printf("a = %d, b = %d\n", a, b);
    return 0;
}
```

20. Write a program in C to find the maximum of two numbers.

```
#include <stdio.h>

int main() {
    int a = 3, b = 4;
    int maximum = 0;
    maximum = a > b ? a : b;
    printf("Maximum: %d\n", maximum);
    return 0;
}
```

21. Write a program in C to find the minumum of three numbers.

```
#include <stdio.h>

int main() {
    int a = 3, b = 4, c = 2;
    int minimum = 0;
    minimum = a < b ? a : b;
    minimum = minimum < c ? minimum : c;
    printf("Minimum: %d\n", minimum);
    return 0;
}
```

22. Write a program in C to find whether a given number is odd or even. If the number is odd, print `O`. Otherwise, print `E`.You cannot use any `if ()` statement.

```
#include <stdio.h>

int main() {
    int n = 4;
    printf("%c\n", n % 2 ? 'O' : 'E');
    return 0;
}
```

23. Write a program in C to find if a year is a leap year. If it is a leap year, print `Y`. Otherwise, print `N`. You cannot use any `if ()` statement.

```c
#include <stdio.h>

int main() {
    int y = 500;
    printf("%c\n", y % 400 == 0 || (y % 4 == 0 && y % 100 != 0) ? 'Y' : 'N');
    printf("%c\n", !(y % 400) || (!(y % 4) && y % 100) ? 'Y' : 'N');
    return 0;
}
```