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Subject: Introduction To Algorithms (EC351)

Problem Statement:

Write a C program to

- Find sum of two numbers A and B.
- Convert Celsius to Fahrenheit and Fahrenheit to Celsius.
- Find area and perimeter of Square.
- Find compound interest.
- Swap two numbers using Temporary variable.
- Find smallest of two numbers A and B.
- Largest of three numbers A, B and C.
- Find all even numbers between 1 to 50.
- Find sum of series 1+2+3+4+……..+N.

Find out the time complexity of all the problems. Write comments and observations for each problem.

1. Sum of two numbers A and B:

- Program:

```
#include<stdio.h>
int main()
{
    int A, B, C;
    printf("Enter first number:  \n");
    scanf("%d\n", &A);
    printf("Enter second number:  \n");
    scanf("%d\n", &B);
    C = A+B;
    printf("\n Result:   ");
    scanf("%d\n", &C);

    return 0;
}
```

- Output:

```
Enter first number:
4
Enter second number:
5
Result:
9
```

- Time Complexity:

Time Complexity is constant in time O(1).

2. Convert Celsius to Fahrenheit and Fahrenheit to Celsius:

- Program:

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

```
{
        int ch;
        float celsius, fahrenheit, temp;
        printf("\n 1. Fahrenheit to Celsius Conversion.\n");
        printf("\n 2. Celsius to Fahrenheit\n");
        printf("\n Enter your choice:  \n");
        scanf("%d\n", &temp);
        switch (ch)
        {
                case 1:
                        printf("\n Enter temperature in Fahrenheit:   ");
                        scanf("%f", &fahrenheit);
                        temp = ((fahrenheit – 32) * 5/9);
                        printf("\n Temperature in Celsius is:  %f C\n", temp);
                        break;
                case 2:
                        printf("\n Enter temperature in Celsius:   ");
                        scanf("%f", &celsius);
                        temp = (celsius * 9/5) + 32;
                        printf("\n Temperature in Fahrenheit is:  %f F\n", temp);
                        break;
                case 3:
                        printf("\n Invalid Choice \n");
                        break;
        }
        return 0;
}
```

- Output:

First Run:

1. Fahrenheit to Celsius

2. Celsius to Fahrenheit

Enter your choice:

1

Enter temperature in Fahrenheit:

98.6 F

Temperature in Celsius is:

37.00 C

Second Run:

1. Fahrenheit to Celsius

2. Celsius to Fahrenheit

Enter your choice:

2

Enter temperature in Celsius:

37.00 C

Temperature in Fahrenheit:

98.6 F

- Time Complexity:

Time complexity is constant in time O(1).

3. Find area and perimeter of a Square:

- Program:

```
#include<stdio.h>
#include<math.h>
int main()
{
        int side, perimeter, area;
        printf("Enter the length of side of Square:  ");
        scanf("%d\n", &side);
        perimeter = 4*s;
```

```
        area = s^2;
        printf("\n Perimeter of Square:  \n");
        scanf("%d\n", &perimeter);
        printf("\n Area of Square:  \n");
        scanf("%d\n", &area);

        return 0;
}
```

- Output:

```
Enter length of side of Square:
5
Perimeter of Square:
20
Area of Square:
25
```

- Time Complexity:

Time complexity is constant in time O(1).

4. Find compound interest:

- Program:

```
#include<stdio.h>
#include<math.h>
int main()
{
        float principle, rate, year, ci;
        printf("Enter Principle:  ");
        scanf("%f\n", &principle);
        printf("Enter Rate:  ");
        scanf("%f\n", &rate);
        printf("Enter time in years:   ");
```

```
        scanf("%f\n", &year);


        ci = principle*((pow((1 + rate/100), year) – 1));
        printf("Compound Interest is:  %f\n", ci);


        return 0;
}
```

- Output:

```
Enter principle:
10000
Enter rate:
10.25
Enter time in years:
5
Compound Interest:
6288.94
```

- Time Complexity:

Time complexity is constant in time O(1).

5. Swap two numbers using Temporary variable:

- Program:

```
#include<studio.h>
int main()
{
        int x, y;
        printf("Enter value of x:  ");
        scanf("%d\n", &x);
        printf("Enter value of y:  ");
        scanf("%d\n", &y);
```

```
        int temp = x;
        x = y;
        y = temp;

        printf("\n After Swapping: \n x = %d\n  y = %d\n ", x, y);
        return 0;
}
```

- Output:

```
Enter value of x:
2
Enter value of y:
5
After Swapping:
x = 5
y = 2
```

- Time Complexity:

Time Complexity is constant in time O(1).

6. Find smallest of two numbers A and B:

- Program:

```
#include<stdio.h>
int main()
{
        int A, B;
        printf("Enter the first number:   ");
        scanf("%d\n", &A);
        printf("Enter the second number:  ");
        scanf("%d\n", &B);
        if (A > B)
        {
```

```
            printf("Smallest number is:  ");
            scanf("%d", &B);
        }
        else
        {
            printf("Smallest number is:   ");
            scanf("%d", &A);
        }
}
```

- Output:

```
Enter the first number:
12
Enter the second number:
23
Smallest number is:
12
```

- Time Complexity:

Time Complexity is constant in time O(1).

7. Find largest of three numbers A, B and C:

- Program:

```
#include<stdio.h>
int main()
{
        int A, B, C;
        printf("Enter first number:   ");
        scanf("%d\n", &A);
        printf("Enter second number:   ");
        scanf("%d\n", &B);
        printf("Enter third number:   ");
```

```
        scanf("%d\n", &C);
        if (A > = B)
        {
                if (A > = C)
                        printf("%d is the largest number.",  A);
                else
                        printf("%d is the largest number.",  C);
        }
        else
        {
                if (B > = C)
                        printf("%d is the largest number.",  B);
                else
                        printf("%d is the largest number.",  C);
        }
        return 0;
}
```

- Output:

Enter first number:

12

Enter second number:

19

Enter third number:

10

19 is the largest number.

- Time Complexity:

Time complexity is constant in time O(1).

8. Find even numbers between 1 to 50:

- Program:

```
#include<stdio.h>
int main()
{
	int i, n;
	printf(“Print all even numbers till:  ”);
	scanf(“%d\n”, &n);
	printf(“Even numbers from 1 to %d are:   \n”, n);
	for(i = 1; i < = n; i++)
	{
		if (i % 2 == 0)
		{
			printf(“%d\n”, i);
		}
	}
	return 0;
}
```

- Output:

```
Print all even numbers till:
50
Even numbers from 1 to 50 are:
2 4 6 8 10 12 14 16 20……
```

- Time Complexity:

Time Complexity is linear time O(n) because it depends on the value of ‘n’. If number of iterations increases, n increases which means time complexity increases. Usually, whenever there is iteration or function calling, time complexity depends on n.

9. Find sum of series 1+2+3+4+…….+N:

- Program:

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

```
    int n, i;
    int sum = 0;
    printf("Enter the n i.e., last term of the series:  ");
    scanf("%d\n", &n);
    sum = (n* (n + 1))/2;
    printf("Sum of series:  \n");
    for(i = 1; i < = n; i++)
    {
        if (i! = n)
        {
            printf("%d + ", i);
        }
        else
        {
            printf("%d = %d", i, sum);
        }
    }
    return 0;
}
```

- Output:

Enter the n i.e., last term of series:

35

Sum of Series:

1+2+3+4……+35

Sum = 630

- Time Complexity:

Time Complexity is linear time O(n) because it depends on the value of 'n'. If number of iterations increases, n increases which means time complexity increases. Usually, whenever there is iteration or function calling, time complexity depends on n.