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3EIC-2
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UCS540
Data Structures and Algorithms
LAB ASSIGNMENT 1

1) Write a program in C to convert miles into kilometers (Km). Hint: 1 Mile=1.609 Km. [Use macros, relevant name and types for variables].

```c
1   #include <stdio.h>
2 - int main() {
3       double miles, kilometers;
4       int x=1.609;
5       printf("Enter distance in miles: ");
6       scanf("%lf", &miles);
7       kilometers = miles * x;
8       printf("%.2f miles is equal to %.2f kilometers\n", miles, kilometers);
9       return 0;
10  }
```

```
/tmp/yviE38tZVu.o
Enter distance in miles: 55
55.00 miles is equal to 55.00 kilometers
```

2) Write a program to find the number of positive, negative and zeros in a sequence of inputs (numbers) entered as data.

```c
1  #include <stdio.h>
2  int main()
3 - {
4      int limit, num, positive = 0, negative = 0, zero = 0;
5      printf("Enter the limit\n");
6      scanf("%d", &limit);
7      printf("Enter %d numbers\n", limit);
8      while(limit)
9 -    {
10         scanf("%d", &num);
11         if(num > 0)
12 -        {
13             positive++;
14         }
15         else if(num < 0)
16 -        {
17             negative++;
18         }
19         else
20 -        {
21             zero++;
22         }
23         limit--;
24     }
25     printf("\nPositive Numbers: %d\n", positive);
26     printf("Negative Numbers: %d\n", negative);
27     printf("Number of zero: %d\n", zero);
28     return 0;
29 }
```

```
/tmp/yviE38tZVu.o
Enter the limit
6
Enter 6 numbers
5
-5
89
-89
0
0
Positive Numbers: 2
Negative Numbers: 2
Number of zero: 2
```

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3) Compute the tax due based on a tax table given below:

Program Input: Salary amount.

Program Output: Returns the tax due for 0.0 <= salary <= 150,000.00; returns -1.0 if salary is outside the table range.

```c
1  #include <stdio.h>
2  float fun(int n)
3 ▾ {
4 ▾     if(n<0){
5          return -1;
6      }
7 ▾     else if (n>=0 && n<15000){
8          return 0;
9      }
10 ▾    else if (n>=15000 && n<30000){
11         return (2250*18/100);
12     }
13 ▾    else if (n>=30000 && n<50000){
14         return (5400*22/100);
15     }
16 ▾    else if (n>=50000 && n<80000){
17         return (11000*27/100);
18     }
19 ▾    else if (n>=80000 && n<150000){
20         return (21600*33/100);
21     }
22 ▾    else{
23         return -10;
24     }
25  }
26 ▾ int main(){
27     int n;
28     printf("Enter your salary: ");
29     scanf("%d",&n);
30     printf("\n");
31     printf("%.2f", fun(n));
32     return 0;
33  }
```

```
/tmp/yviE38tZVu.o
Enter your salary: 15026
405.00
```

4) Write an interactive program (menu driven) in 'C' (using functions) to compute the area of a selected geometrical figure from a list of such figures (square, rectangle, and circle).

```c
1  #include<stdio.h>
2  void main ()
3▾ {
4          int choice,radius,length,width,base;
5          float area;
6          printf("Input 1 for area of circle\n");
7          printf("Input 2 for area of rectangle\n");
8          printf("Input 3 for area of square\n");
9          printf("Input your choice : ");
10         scanf("%d",&choice);
11         switch(choice)
12▾        {
13             case 1:
14                 printf("Input radius of the circle : ");
15                 scanf("%d",&radius);
16                 area=3.14*radius*radius;
17                 break;
18             case 2:
19                 printf("Input length and width of the rectangle : ");
20                 scanf("%d%d",&length,&width);
21                 area=length*width;
22                 break;
23             case 3:
24                 printf("Input the base and height of the square :");
25                 scanf("%d",&base);
26                 area=base*base;
27                 break;
28         }
29         printf("The area is : %f\n",area);
30 }
```

```
/tmp/yviE38tZVu.o
Input 1 for area of circle
Input 2 for area of rectangle
Input 3 for area of square
Input your choice : 1
Input radius of the circle : 55
The area is : 9498.500000
```

5) Write a program to display first n elements of Fibonacci series.

```c
1   #include <stdio.h>
2   int main()
3   {
4       int num, a=-1,b=1,c;
5       printf("Enter a number: ");
6       scanf("%d",&num);
7       printf("Fibonacci series: ");
8       for(int i=0;i<num;i++)
9       {
10          c=a+b;
11          printf("%d, ",c);
12          a=b;
13          b=c;
14      }
15      return 0;
16  }
```

```
/tmp/yviE38tZVu.o
Enter a number: 6
Fibonacci series: 0, 1, 1, 2, 3, 5, |
```

6) Write a program to print a table book from Table X to Table Y. X and Y are user inputs.

```
1  #include <stdio.h>
2▾ int main() {
3      int n;
4      printf("Enter an integer: ");
5      scanf("%d", &n);
6
7▾     for (int i = 1; i <= 10; ++i) {
8          printf("%d * %d = %d \n", n, i, n * i);
9      }
10     return 0;
11  }
```

```
/tmp/yviE38tZVu.o
Enter an integer: 56
56 * 1 = 56
56 * 2 = 112
56 * 3 = 168
56 * 4 = 224
56 * 5 = 280
56 * 6 = 336
56 * 7 = 392
56 * 8 = 448
56 * 9 = 504
56 * 10 = 560
```

7) Write a program to compute factorial of a number using iterative approach.

```
1▾ int main() {
2      int i, num, factorial = 1;
3      printf("Enter a whole number to find Factorial = ");
4      scanf("%d", &num);
5▾     for (i = 1; i<=num; i++) {
6          factorial = factorial * i;
7      }
8      printf("Factorial of %d is: %d", num, factorial);
9      return 0;
10  }
```

```
/tmp/yviE38tZVu.o
Enter a whole number to find Factorial = 5
Factorial of 5 is: 120
```

8) Write a program to swap two numbers using functions.

```c
1   #include<stdio.h>
2
3   int main()
4   {
5       int a, b;
6       printf("Enter values for a and b\n");
7       scanf("%d%d", &a, &b);
8       printf("\n\nBefore swapping: a = %d and b = %d\n", a, b);
9       swap(a, b);
10      return 0;
11  }
12  void swap(int x, int y)
13  {
14      int temp;
15      temp = x;
16      x    = y;
17      y    = temp;
18      printf("\nAfter swapping: a = %d and b = %d\n", x, y);
19  }
20
```

```
/tmp/yviE38tZVu.o
Enter values for a and b
56
65
Before swapping: a = 56 and b = 65

After swapping: a = 65 and b = 56
```

9) Write a function that returns the first integer between n_min and n_max entered as data to the calling function (main).

```c
1   #include <stdio.h>
2
3 ▾ int FirstInteger(int n_min, int n_max) {
4       int num;
5
6       printf("Enter an integer between %d and %d (both inclusive): ", n_min,
            n_max);
7       scanf("%d", &num);
8
9 ▾     while (num < n_min || num > n_max) {
10          printf("Invalid input, enter an integer between %d and %d (inclusive):
                ", n_min, n_max);
11          scanf("%d", &num);
12      }
13
14      return num;
15  }
16
17 ▾ int main() {
18      int n_min, n_max, result;
19
20      printf("Enter the minimum value: ");
21      scanf("%d", &n_min);
22
23      printf("Enter the maximum value: ");
24      scanf("%d", &n_max);
25
26
27      result = FirstInteger(n_min, n_max);
28
29
30      printf("The first integer in the range %d to %d is: %d\n", n_min, n_max,
            result);
31
32      return 0;
```

```
/tmp/yviE38tZVu.o
Enter the minimum value: 55
Enter the maximum value: 100
Enter an integer between 55 and 100 (both inclusive): 55
The first integer in the range 55 to 100 is: 55
```

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10) Write nests of loops that cause the following output to be displayed.

```
1   #include <stdio.h>
2
3 ▾ int main() {
4       int n = 5;
5
6
7 ▾     for (int i = 0; i <= n; ++i) {
8 ▾         for (int j = 0; j <= i; ++j) {
9               printf("%d", j);
10          }
11          printf("\n");
12      }
13
14 ▾    for (int i = n - 1; i >= 0; --i) {
15 ▾        for (int j = 0; j <= i; ++j) {
16              printf("%d", j);
17          }
18          printf("\n");
19      }
20
21      return 0;
22  }
```
```
/tmp/yviE38tZVu.o
0
01
012
0123
01234
012345
01234
0123
012
01
0
```