People's Democratic Republic of Algeria

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DS & ALGO : Series 02

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Exercise 1

Code:

```c
#include<stdio.h>

int main() {
    //first version
    int a,b,i,prod = 0;
    do {
        printf("Enter two positive integers a,b : ");
        scanf("%d %d" , &a , &b);
        if(a < 1 || b < 1) {
            printf("Error! both integers must be positive");
        }
    }while(a < 1 || b < 1);
    for(i = 0 ; i < b; i++ ) {
        prod += a;
    }
    printf("%d x %d = %d \n", a , b , prod);
    //second version
    int A,A_copy,B,div = 0;
    do {
        printf("Enter two positive integers a,b such that a > b : ")
            ;
        scanf("%d %d" , &A , &B);
        if(A < 1 || B < 1 || B > A) {
            printf("Error! both integers must be positive and a > b"
                );
        }
    }while(A < 1 || B < 1 || B > A);
    A_copy = A;
    while(A_copy >= B) {
        A_copy -= B;
        div++;
    }
    printf("The integer division %d / %d = %d \n ", A , B , div);
    return 0;
}
```

Exercise 2

Code:

```c
#include<stdio.h>

int main() {
```

```
    int n,fact = 1,i;
    do {
        printf("Enter a positive integer : ");
        scanf("%d" , &n);
        if(n < 0) {
            printf("Error! the integer must be positive");
        }
    }while(n < 0);
    if(n == 0 || n == 1) {
        printf("%d ! = 1",n);
    }
    else {
        for(i = 2; i <= n ; i++) {
            fact *= i;
        }
        printf("%d! = %d ",n , fact);
    }
    return 0;
}
```

Exercise 3

Code:

```
#include<stdio.h>

int main() {
    int n , S_1=0;
    float a , x , S_2 = 0 , S_3 = 0, S_4 = 0;
    //S_1
    do{
        printf("Enter an odd number n between 20 and 100: ");
        scanf("%d",&n);
        if(n < 20 || n > 100 || n % 2 != 1) {
            printf("The number must me odd and between 20 and 100");
        }
    }while(n < 20 || n > 100 || n % 2 != 1);
    int i = 1;
    int sign = 1;
    while(i <= n) {
        S_1 += i * sign;
        sign = -sign;
        i += 2;
    }
    printf("S_1 = %d \n",S_1);
    //S_2
    do{
```

```
24          printf("Enter an integer n between 10 and 50");
25          scanf("%d",&n);
26          if(n < 10 || n > 50 ) {
27              printf("The number n must be between 10 and 50");
28          }
29      }while(n < 10 || n > 50);
30      for(i = 1 ; i <= n ; i++) {
31          S_2 += (float) i / (2*i-1);
32      }
33      printf("S_2 = %f \n",S_2);
34      //S_3
35      do{
36          printf("Enter an integer n strictly greater than 5 and a
                real number x");
37          scanf("%d %f",&n,&x);
38          if(n < 5) {
39              printf("n must be strictly greater than 5");
40          }
41      }while(n < 5);
42      int fact = 1;
43      for(i = 1 ; i <= n+1 ; i++) {
44          S_3 = (float)(x+i-1) / fact;
45          fact *= (i+1);
46      }
47      printf("S_3 = %f \n",S_3);
48      //S_4
49      do{
50          printf("Enter two real numbers a , x and an integer n
                greater than 10 ");
51          scanf("%f %f %d",&a,&x,&n);
52          if(n < 10) {
53              printf("The number n must be greater than 10");
54          }
55      }while(n < 10);
56      for(i = 2 ; i < n ; i++) {
57          x *= x;
58      }
59      for( i = 1 ; i <= n ; i++) {
60          S_4 += a * x;
61          a *= a;
62          x /= x;
63      }
64      printf("S_4 = %f", S_4);
65      return 0;
66  }
```

Exercise 4

Code:

```c
#include<stdio.h>

int main() {
    int n,m,number,div,div_sum;
    do{
        printf("Enter two strictly positive integers n , m such that n < m : ");
        scanf("%d %d",&n , &m);
        if(n < 0 || m < 0 || n > m) printf("n , m must be strictly postiive and n < m");
    }while(n < 0 || m < 0 || n > m);

    for(number  = n ; number <= m ; number++) {
        div_sum = 1;
        for(div = 2 ; div <= number/2 ; div++) {
            if(number % div == 0) {
                div_sum += div;
            }
        }
        if(div_sum == number) printf("%d is a perfect number \n", number);
    }
    return 0;
}
```

Exercise 5

Code:

```c
#include <stdio.h>

int main() {
    int n;
    float u = 2.0, v, sum = 0.0;

    for (n = 0; n < 100; n++) {
        v = 1 - (1 / u);
        sum += v;
        u = 1 + (1 / v);
    }
    printf(": %f \n", sum);
    return 0;
}
```

Exercise 6

Code:

```c
#include<stdio.h>

int main() {
    int n,n_copy,possible_digits,digit,counter;
    do{
        printf("Enter a strictly positive integer n : ");
        scanf("%d",&n);
        if(n < 0) printf("n must be strictly positive");
    }while(n < 0);
    for(possible_digits = 0 ; possible_digits < 10 ; possible_digits
       ++){
        counter = 0;
        n_copy = n;
        while(n_copy >= 1) {
            digit = n_copy % 10;
            n_copy /= 10;
            if(possible_digits == digit) counter++;
        }
        if(counter != 0) printf("The digit %d appeared %d times \n",
           possible_digits,counter);
    }
    return 0;
}
```