CMR Engineering College

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2022-26_I_CS_B_C Programming Lab

C PROGRAMMING LAB_ADDITIONAL EXERCISE_LOOPING STATEMENTS

Attempt : 1
Total Mark : 50
Marks Obtained : 30

Section 1 : CODING

1. Arjun and Babu are friends, they are playing the matchstick game. In this game, a group of matchsticks is placed on the floor. The players can pick any number of matchsticks from 1 to 4 (both inclusive) during their chance. The player who takes the last match stick wins the game. If Arjun starts first, how many matchsticks should he pick such that he is guaranteed to win the game?

Write a suitable program to help Arjun.

Note : Consider the game is played optimally.

Answer

```
#include<stdio.h>
int main(){
   int matches;
   scanf("%d",&matches);

   int move=matches%5;
   if(move)    printf("%d",move);
   else        printf("You are a loser");
```

}

Status : Correct ***Marks : 10/10***

2. Math Challenge

In connection to the National Mathematics Day celebration, the Regional Mathematical Scholars Society had arranged for a Math Challenge Event where high school students participated in large number. First level of the challenge was oral quiz, followed by a written test in the second round.

In the second round, the problem that the students had to answer goes like this:

For every positive number ‘n’ we define a function streak(n)=k as the smallest positive integer k such that n+k is not divisible by k+1.

E.g:

13 is divisible by 1

14 is divisible by 2

15 is divisible by 3

16 is divisible by 4

17 is NOT divisible by 5

So streak(13)=4.

Similarly:

120 is divisible by 1

121 is NOT divisible by 2

So streak(120)=1.

Now, define P(s,N) to be the number of integers n, 1<n<N, for which streak(n)=s. Write a program to get the input as 's' and 'N' and find the count of integers until N which has the streak value as 's'.

For example,

If s=3 and N=14.

If we compute streak value for the integers from 1 to N, we can see only the integer 7 have the streak value as 3, because

7 is divisible by 1

8 is divisible by 2

9 is divisible by 3

10 is NOT divisible by 4

Hence streak(7)=3.

So P(3, 14) = 1 and so the output is 1.

Answer

```
#include<stdio.h>
int streak(int n);
int P(int s,int N);
int main(){
    int s, N;
    scanf("%d%d",&s,&N);
    printf("%d",P(s,N));
}

int streak(int n){
    int k=0;
    while((n+k)%(k+1)==0) k++;
    return k;
}
int P(int s,int N){
    int count=0;
    for(int i=2;i<=N;i++){
        if(streak(i)==s)    count++;
    }
    return count;
}
```

Status : Correct ***Marks : 10/10***

3. Arun loves to do multitask. He wants to design a new type of device which does multitask like him. The device should perform 4 tasks based

on the code entered by the user. Task details and corresponding code details are given below. Users should enter a number and task code as shown in the sample input.

A to calculate the sum of first and last digit of the given number

B to check number is palindrome or not

C to count the number of digits in the given number

D to print it into words

Answer

```
#include<stdio.h>
#include<math.h>
int fplusl(int num);
int palindrome(int num);
int digitcount(int num);
void spell(int num);
int firstdigit(int num);
int main(){
   int num;
   char mode=100;
   scanf("%d",&num);
   scanf("\n");
   scanf("%c",&mode);

   switch(mode){
      case 'a':
      case 'A':
         printf("Sum of first and last digit: %d",fplusl(num));
         break;
      case 'b':
      case 'B':
         printf("%salindrome",palindrome(num)?"P":"Not p");
         break;
      case 'c':
      case 'C':
         printf("Number of Digits: %d",digitcount(num));
         break;
      case 'd':
      case 'D':
```

```
            spell(num);
    }
}
int fplusl(int num){
    int f=num%10;
    int l=num%10;
    while(num!=0){
        l=num%10;
        num/=10;
    }
    return f+l;
}
int palindrome(int num){
    int i=digitcount(num);
    for(int j=1;j<=(i+1)/2;j++){
        if(num/(int)pow(10,j-1)%10!=num/(int)pow(10,i-j)%10) return 0;
    }
    return 1;
}
int digitcount(int num){
    if(num==0)  return 1;
    int i=1;
    while((num/=10)!=0) i++;
    return i;
}
void spell(int num){
    int i=digitcount(num);
    char *a;
    for(int j=i;j>0;j--){
        switch(num/(int)pow(10,j-1)%10){
            case 1:a="one";break;
            case 2:a="two";break;
            case 3:a="three";break;
            case 4:a="four";break;
            case 5:a="five";break;
            case 6:a="six";break;
            case 7:a="seven";break;
            case 8:a="eight";break;
            case 9:a="nine";break;
            case 0:a="zero";
        }
        printf("%s ",a);
```

```
    }
}
```

Status : Correct ***Marks : 10/10***

4. Charity Dinner

WeCanNGO Trust is organizing a charity dinner at St. John's College. Since older students are both wiser and richer, the members of the trust decide that the price of each ticket will be based on how many years the students have been in the school. A first year student will buy a PINK ticket, a second year student will buy a GREEN ticket, a third year student will buy a RED ticket, and a fourth year student will buy an ORANGE ticket.

Assume that all tickets are sold. Each color of ticket is uniquely priced. Write a program to output all combinations of tickets that produce exactly the desired amount to be raised. The combinations may appear in a specific order. First ORANGE is considered, then RED, then GREEN and finally PINK. Also display the total number of combinations found and the smallest number of tickets to be printed to raise the desired amount so that printing cost is minimized.

Answer

-

Status : Skipped ***Marks : 0/10***

5. Abhishek's wife's birthday is near, so he wants to surprise her by making a special cake for her. Abhishek knows that his wife likes flowers on the cake, so he puts flowers on the top of the cake, but he was not satisfied. Therefore, he decided to alter some of the flowers to make a beautiful pattern. However, Abhishek has a lot of other work to do so he decided to ask for your help.

The flowers are of two colors RED and GREEN. Now Abhishek wants the flowers to be placed in such a way that each flower of one color must be adjacent to only flowers of the other color, two flowers are adjacent if they share a side. Now Abhishek has asked for your help in making that arrangement on the cake.

You can replace any flower of given color with the other color. But there is a cost for each replacement: if you replace a red flower with a green one, the cost is 5 rupees and if you replace a green flower with a red one, the cost is 3 rupees.

Help your friend Abhishek by making the cake special with minimum cost.

Answer

-

Status : Skipped ***Marks : 0/10***