

Algorithms Level 4



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Problem # 59/4 Solution Using C++

```
#include <iostream>
using namespace std;

struct stDate
{
    short Year;
    short Month;
    short Day;
};

struct stPeriod
{
    stDate StartDate;
    stDate EndDate;
};

bool IsDate1BeforeDate2(stDate Date1, stDate Date2)
{
    return (Date1.Year < Date2.Year) ? true : ((Date1.Year ==
Date2.Year) ? (Date1.Month < Date2.Month ? true : (Date1.Month ==
Date2.Month ? Date1.Day < Date2.Day : false)) : false);
}

bool IsDate1EqualDate2(stDate Date1, stDate Date2)
{
    return (Date1.Year == Date2.Year) ? ((Date1.Month ==
Date2.Month) ? ((Date1.Day == Date2.Day) ? true : false) : false)
: false;
}

bool IsDate1AfterDate2(stDate Date1, stDate Date2)
{
    return (!IsDate1BeforeDate2(Date1, Date2) &&
!IsDate1EqualDate2(Date1, Date2));
}

bool isLeapYear(short Year)
{
    return (Year % 4 == 0 && Year % 100 != 0) || (Year % 400 == 0);
}
```



Problem # 59/4 Solution Using C++

```
short NumberOfDaysInAMonth(short Month, short Year)
{
    if (Month < 1 || Month>12)
        return 0;

    int days[12] = { 31,28,31,30,31,30,31,31,30,31,30,31 };
    return (Month == 2) ? (isLeapYear(Year) ? 29 : 28) :
days[Month - 1];
}

bool IsLastDayInMonth(stDate Date)
{
    return (Date.Day == NumberOfDaysInAMonth(Date.Month,
Date.Year));
}

bool IsLastMonthInYear(short Month)
{
    return (Month == 12);
}

stDate IncreaseDateByOneDay(stDate Date)
{
    if (IsLastDayInMonth(Date))
    {
        if (IsLastMonthInYear(Date.Month))
        {
            Date.Month = 1;
            Date.Day = 1;
            Date.Year++;
        }
        else
        {
            Date.Day = 1;
            Date.Month++;
        }
    }
    else
    {
        Date.Day++;
    }

    return Date;
}
```



Problem # 59/4 Solution Using C++

```
int GetDifferenceInDays(stDate Date1, stDate Date2, bool
IncludeEndDay = false)
{
    int Days = 0;
    while (IsDate1BeforeDate2(Date1, Date2))
    {
        Days++;
        Date1 = IncreaseDateByOneDay(Date1);
    }

    return IncludeEndDay ? ++Days : Days;
}

int PeriodLengthInDays(stPeriod Period, bool IncludeEndDate =
false)
{
    return GetDifferenceInDays(Period.StartDate, Period.EndDate,
IncludeEndDate);
}

short ReadDay()
{
    short Day;
    cout << "\nPlease enter a Day? ";
    cin >> Day;
    return Day;
}

short ReadMonth()
{
    short Month;
    cout << "Please enter a Month? ";
    cin >> Month;
    return Month;
}

short ReadYear()
{
    short Year;
    cout << "Please enter a Year? ";
    cin >> Year;
    return Year;
}
```



Problem # 59/4 Solution Using C++

```
stDate ReadFullDate()
{
    stDate Date;

    Date.Day = ReadDay();
    Date.Month = ReadMonth();
    Date.Year = ReadYear();

    return Date;
}

stPeriod ReadPeriod()
{
    stPeriod Period;
    cout << "\nEnter Start Date:\n";
    Period.StartDate = ReadFullDate();
    cout << "\nEnter End Date:\n";
    Period.EndDate = ReadFullDate();
    return Period;
}

int main()
{
    cout << "\nEnter Period 1:";
    stPeriod Period1 = ReadPeriod();

    cout << "\nPeriod Length is: " << PeriodLengthInDays(Period1);
    cout << "\nPeriod Length (Including End Date) is: " <<
PeriodLengthInDays(Period1, true);

    system("pause>0");

    return 0;
}
```