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MAGIC CALENDAR II: From (0001 – 4000)

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ABSTRACT

To find the day of the year from the given date.

Keywords: *Odd days, Modulus 7, Quotient of leap year (Q_{ly}), Remainder of leap year (R_{ly}), Quotient of non-leap year (Q_{ny}), Remainder 1, Remainder 2.*

INTRODUCTION

A calendar is a system of organizing days for social, religious, commercial or administrative purpose. This is done by giving names to period of time typically days, weeks, months, and years. But to find out the day of the week from the given date is a quite long method. Few mathematicians have given some shortcut methods which are quite good so here is one more method to find the day of the week from the given date.

RESULT

We only find out the number of odd days from the given date and for a given day we find the 1st date of that month and year afterwards we consider the below given table,

Number of odd days (Required day)	Day we consider
0	Sunday
1	Monday
2	Tuesday
3	Wednesday
4	Thursday
5	Friday
6	Saturday

FOR LEAP YEARS: FROM (0001-4000)

We divide the given date into 4 parts,

A = Date
B = Month
C = Year
D = Value for particular years of interval.

Required day (X) = (A+B+C+D+3) mod7

- Take the value of **A** as it is given.
- For the value of **B** we follow the below given table,

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Month	B
January	0
February	3
March	4
April	0
May	2
June	5
July	0
August	3
September	6
October	1
November	4
December	6

- For the value of **C** we divide the last two digits of the given year by 4 and note down the quotient (Q_{ly}) and then divide the quotient of leap(Q_{ly}) year by 7 and then follow the below given table,

- For the value of **D** we follow the below given table as per the given year.

Remainder of leap year (R_{ly})	0	1	2	3	4	5	6
C	0	5	3	1	6	4	2

Intervals of years.	D
0001-0100,0701-0800,1401-1500,1776-1800,2101-2200,2501-2600,2901-3000,3301-3400,3701-3800.	0
0101-0200,0801-0900,1501-1600.	6
0201-0300,0901-1000,1601-1700,1801-1900, 2201-2300,2601-2700,3001-3200,3401-3500, 3801-3900.	5
0301-0400,1001-1100,1701-1775.	4
0401-0500,1101-1200,1901-2000,2301-2400, 2701-2800,3101-3200,3501-3600,3901-4000.	3
0501-0600,1201-1300,2001-2100,2401-2500, 2801-2900,3201-3300,3601-3700.	2
0601-0700,1301-1400.	1

Example:

- 26th October,1996

Solution:

Here we divide the date into 4 parts, A,B,C and D also as it is leap year so we add 3 too,

So the required day

$$X = (A+B+C+D+3) \bmod 7$$

Here,

A = 26
B = 1 (From the table of months)

For C,
Taking the last two digits of the year and dividing them by 4 we get,

$96/4 = 24$ (Q_{ly})

Then, Dividing quotient of leap year by 7 and note down its remainder (R_{ly})

$24/7 = (3*7) + 3$

So, we get 3 as the remainder of quotient of leap year (R_{ly}) for which the value of **C** is 1

C = 1

Now for **D**, we already have a table and the year 1996 belongs to the interval (1901-2000) for which the value of D is 3.

D = 3

Thus we found our all the variables A, B, C and D.

So the required day,

X = (A+B+C+D+3) mod7
= (26+1+1+3+3) mod7
= (34) mod7
= 6
= Saturday (from table of days)

Thus the required day is Saturday.

FOR NON-LEAP YEAR: FROM (0001-4000)

We divide the given date into 4 parts,

A = Date
B = Month
C = Year
D = Value for particular years of interval.

Required day (X) = (A+B+C+D) mod7

- Take the value of **A** as it is given.
- For the value of **B** we follow the below given table

Month	**B**
January	0
February	3
March	3
April	6
May	1
June	4
July	6
August	2
September	5
October	0
November	3
December	5

- Than for **C** we divide the last two digits by 4 and note down the quotient (Q_{ny}), and also remainder 1 (as R_1^{th} term).
- Further we divide the quotient (Q_{ny}) by 7 and note down the remainder 2 as R_2.
- And then follow the below given table to evaluate **C**,

R_2		0	1	2	3	4	5	6
C	R_1^{th} term							
	1^{st}	5	3	1	6	4	2	0
	2^{nd}	6	4	2	0	5	3	1
	3^{rd}	0	5	3	1	6	4	2

- For the value of **D** we follow the below given table as per the given year,

Intervals of years	**D**
0001-0100,0701-0800,1401-1500,1753-1800, 2101-2200,2501-2600,2901-3000,3301-3400,3701-3800.	0
0101-0200,0801-0900,1501-1600.	6
0201-0300,0901-1000,1601-1700,1801-1900, 2201-2300,2601-2700,3001-3100,3401-3500,3801-3900.	5
0301-0400,1001-1100,1701-1752.	4
0401-0500,1101-1200,1901-2000,2301-2400, 2701-2800,3101-3200,3501-3600,3901-4000.	3
0501-0600,1201-1300,2001-2100,2401-2500, 2801-2900,3201-3300,3401-3700.	2
0601-0700,1301-1400.	1

Example:

- 17^{th} April,1997

We divide the date into 4 parts A, B, C and D.
Here,
A = 17
B = 6 (From the table of months for non-leap year)

For **C,**

We divide the last two digits of the year by 4 so we get,
97/4
Quotient (Q_{ny}) = 24
Remainder 1(R_1) = 1 (i.e. 1^{st} term)

Now we divide the quotient (Q_{ny}) by 7 so we get,
24/7
Remainder 2 (R_2) = 3

As per the table the value of C is 6 [$R_2 = 3$ and $R_1 = 1$]
C = 6
And for value of **D** we have year as 1997 which is in the interval 1901-2000 for which the value of D is 3
D = 3

Thus we found all the variables A, B , C and D.

Therefore required day X is,

X = (A+B+C+D) mod7
= (17+6+6+3) mod7
= (32) mod7
= 4
= Thursday. (From the table of days)

Thus the required day is Thursday.

CONCLUSION

Using the above method it is quite easier to find the day of the week from the given date in the interval of years from (0001-4000).

REFERENCE

1. Magic-Calendar (IJMA-8390)
2. www.timeanddate.com

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