

**Date**

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**REVISION HISTORY**

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# Chapter 1

## Date

### 1.1 Date.doc

```
--background--
--history-- ()
GregorianDayDiff ()
GregorianDayGreater ()
GregorianDaysAfterWeekday ()
GregorianDaysBeforeWeekday ()
GregorianDaySmaller ()
GregorianDiffDate ()
GregorianEaster ()
GregorianLeapYear ()
GregorianMonthDays ()
GregorianMoonAge ()
GregorianToJD ()
GregorianWeek ()
GregorianWeekday ()
GregorianYearDays ()
GYearToJD ()
GYearToScaliger ()
HeisDayDiff ()
HeisDayGreater ()
HeisDaysAfterWeekday ()
HeisDaysBeforeWeekday ()
HeisDaySmaller ()
HeisDiffDate ()
HeisLeapYear ()
HeisMonthDays ()
HeisToJD ()
HeisWeek ()
HeisWeekday ()
HeisYearDays ()
HYearToJD ()
HYearToScaliger ()
JDtoMJD ()
JDToTime ()
JYearToJD ()
JulianDayDiff ()
JulianDayGreater ()
JulianDaysAfterWeekday ()
```

```
JulianDaysBeforeWeekday()  
JulianDaySmaller()  
JulianDiffDate()  
JulianLeapYear()  
JulianMonthDays()  
JulianToJD()  
JulianWeek()  
JulianWeekday()  
JulianYearDays()  
JYearToScaliger()  
LMT  
MJDtoJD()  
ScaligerYearToG()  
ScaligerYearToH()  
ScaligerYearToJ()  
SecToTime()  
TimeToJD()  
TimeToSec()  
TimeZoneFactor()
```

## 1.2 Date/--background--

### NAME

Date -- This module was designed to help calc. calendar dates (V33)

### FUNCTION

I know about the date routines in the Amiga-OS(TM), but I decided not to use them, because of their limited functionalities and of the portability of this module!

### NOTES

A tropical year is 365.2422 days! / 365d, 5h, 48min, 46sec

A moon month is 29.53059 days! / 29d, 12h, 44min, 2.9 sec

A moon phase is 7.38265 days!

(German) Books which helped me creating this library:

Kleine Naturwissenschaftliche Bibliothek, Band 23

Ewige Kalender

A.W. Butkewitsch & M.S. Selikson

5. Auflage

Teubner, Leipzig 1974

ISBN 3-322-00393-0

Tag und Woche, Monat und Jahr: eine Kulturgeschichte des  
Kalenders

Rudolf Wendorff

Westdeutscher, Opladen 1993

ISBN 3-531-12417-X

Kalender und Chronologie: Bekanntes & Unbekanntes aus der  
Kalenderwissenschaft

Heinz Zemanek

4. Auflage

Oldenbourg, München 1987

ISBN 3-486-20447-5

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Meyers Handbuch  
über das Weltall  
Karl Schaifers & Gerhard Traving  
5. Auflage  
Bibliographisches Institut Mannheim 1973  
ISBN 3-411-00940-3

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ISBN 3-411-00940-3

(English) Books which helped me creating this library:

Mathematical Astronomy with a Pocket Calculator  
Aubrey Jones Fras  
unknown(first) Edition  
David & Charles Newton Abbot, London 1978  
ISBN 0-7153-7675-6

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#### ADDITIONAL INFORMATIONS

I have tried to make portable/usefull and I hope bugfree software for eternity - but this seems to be impossible (sorry!) :)  
So I hope you will pay a fee for this.

#### AUTHOR

Kai Hofmann  
Arberger Heerstraße 92  
28307 Bremen  
Germany  
EMail: i07m@alf.zfn.uni-bremen.de  
(no phone - I hate it!)

Bank account : 1203 7503  
Account owner: Kai Hofmann  
Bank code : 290 501 01  
Bank name : Sparkasse in Bremen  
Bank address : 28307 Bremen / Germany

#### THANK

Thanx are going to the following people:  
Danial Armor - For his hint about the Oberon-2 SHORT  
command  
Heinz Zemanek - For his great book  
Christian Schaefer - For spending time on this lib with his  
Borland C++ 4.0 compiler  
Rita Reichl - For correcting my bad english ;-)

## 1.3 Date/--history--

#### NAME

history -- This is the development history of the Date module

#### VERSION

\$VER: Date 33.088 (11.08.1994)

#### HISTORY

16.01.1994 - Procedures: JulianLeapYear, GregorianLeapYear & HeisLeapYear initiated.  
22.01.1994 - Procedures: JulianMonthDays, GregorianMonthDays, HeisMonthDays, JulianYearDays, GregorianYearDays, HeisYearDays, JulianDayDiff, GregorianDayDiff, HeisDayDiff, JulianDaySmaller, GregorianDaySmaller, HeisDaySmaller, JulianWeekday, GregorianWeekday, HeisWeekday, JulianDaysBeforeWeekday, GregorianDaysBeforeWeekday, HeisDaysBeforeWeekday, JulianDaysAfterWeekday, GregorianDaysAfterWeekday,

- HeisDaysAfterWeekday JulianDiffDate, FreeDate initiated.  
Types: Weekdays, Date, DatePtr initiated.  
Vars of Gregorian reform initiated  
(for changing to different countries)
- 23.01.1994 - Procedures: JulianDiffDate finished, GregorianDiffDate, HeisDiffDate, JYearToScaliger, GYearToScaliger, HYearToScaliger, ScaligerYearToJ, ScaligerYearToG, ScaligerYearToH, JSYearToJD, GSYearToJD, HSYearToJD, JDtoMJD, MJDtoJD, JulianToJD, GregorianToJD, HeisToJD, TimeToJD, JDToTime, FreeTime initiated.  
Types: Time, TimePtr initiated.
- 28.01.1994 - Procedures: GregorianMoonAge, MoonMonthAge, GregorianEaster initiated.
- 30.01.1994 - Procedures: JulianDiffDate, GregorianDiffDate, HeisDiffDate, JDtoTime, GregorianEaster edited (changing return value from ptr to VAL variables).  
Procedures: FreeDate, FreeTime deleted.  
Types: Date, DatePtr, Time, TimePtr deleted (not longer needed, because of the procedure changes).  
Procedures: GregorianMoonAge, GregorianEaster changed year parameter from CARDINAL to INTEGER (this is more consistent to the rest of the library).  
Bugs removed: GregorianWeekday, HeisWeekday (before removing, the weekday for leapyears was wrong)  
Procedure: GregorianEaster finished.
- 30.01.1994 - Ported to Oberon-2
- 31.01.1994 - Compiled with Oberon-2 V3.11
- 12.02.1994 - Procedures: TimeZoneFactor, LMT, TimeToSec, SecToTime initiated.  
Version-String installed :)
- 12.02.1994 - Starting translation to SAS C 6.51  
Date.h translated
- 13.02.1994 - Continuation of C translation
- 17.02.1994 - New Oberon-2 Port, because yesterday Daniel Armor gives me a small hint about the SHORT command (I did not know about this!)
- 17.02.1994 - Small bug in Autodocs removed  
making this text as Date/--history-- autodoc
- 17.02.1994 - Continuation of C translation
- 18.02.1994 - Finished with C translation
- 19.02.1994 - C bugs removed (thanx to SAS for helping a C Lamer like me!), some optimizations done too.
- 19.02.1994 - Oberon-2 version compiled with V40.17 includes
- 21.02.1994 - Starting to write Modula-II testmodule  
Vars for the begining of Heis calculation initiated.  
Fixed small bugs in GregorianWeekday, HeisWeekday, TimeToSec, SecToTime  
Return-value of LMT changed to LONGINT!  
Converting testmodule to Oberon-2
- 22.02.1994 - Converting testmodule to C
- 23.02.1994 - I noticed, that I forgot the 3 functions  
JulianWeek, GregorianWeek, HeisWeek
- 24.02.1994 - Initiated the 3 forgotten functions
- 26.02.1994 - Initiating new GregorianEastern with Gauß-algorithms
-

- but ONLY for 1900-2099!
- 27.02.1994 - Bug fixed in JulianWeekday  
Bugs fixed in JulianDayDiff, GregorianDayDiff,  
HeisDayDiff  
JulianDayGreater, GregorianDayGreater,  
HeisDayGreater Initiated.
- 02.03.1994 - Small bug fixed in HeisdayDiff  
Bugs from 27.02. fixed in Modula-II and Oberon-2  
versions  
I found the way to extend Gregorian Easter!  
Small bug fixed in JulianWeek, GregorianWeek,  
HeisWeek (~(M2) is not !(C))
- 05.03.1994 - Some internal bugs removed  
New internal procedures GregorianSB,  
GregorianJHSB, GregorianJHStartSB!  
Extending GregorianEaster :)
- 11.03.1994 - Things from 05.03. done in Modula-II and Oberon
- 12.03.1994 - If \_\_SASC is defined autoinitialization instead of  
\_DateInit will be used!
- 13.03.1994 - After studying the SAS C Manual again I decided to  
check for \_\_SASC\_650 instead of \_\_SASC because of  
the available priorities!  
Setting the priority of \_DateInit for  
autoinitialization to 600!
- 15.03.1994 - Making Date as library
- 16.03.1994 - Some work on the Autodocs was done  
Eliminating OldGregorianEaster by comments  
(ANSI: STOP bad standards like that there are NO  
nested comments possible in C!!!)
- 19.03.1994 - Some work on the Autodocs was done in the M2 Code
- 20.03.1994 - Some work on the Autodocs was done in the Oberon Code
- 22.03.1994 - In JDtoMJD, MJD to JD an L was added to the constant  
In GregorianWeekday(), HeisWeekday(),  
JulianDiffDate(), GregorianDiffDate(),  
HeisDiffDate(), JDToTime() I have inserted  
conversions (found with Borland C++ 4.0)
- 24.03.1994 - Making SunOS4.1.3, SunOS5.3(Solaris2.3) &  
RS6000 AIX3.2.? binaries with gcc  
Eliminating nested comments by inserting a space  
between / and \* (I hate this ANSI C standard  
feature for comments :(
- 27.03.1994 - Adding library register assignments to the autodocs
- 03.04.1994 - Small fixes for the SAS C++ Compiler  
Small bug fixed in the M2 version of GregorianEaster
- 04.04.1994 - Adding some 'static' keywords
- 10.04.1994 - Changing from Shareware to Gift Ware ;-)
- 02.08.1994 - Small fixes in the Autodocs (thanks to Rita Reichl  
for correcting my bad english ;-)
- 11.08.1994 - Again small fixes in the Autodocs!

## 1.4 Date/GregorianDayDiff

NAME

GregorianDayDiff -- Calculates the days between 2 dates. (V33)

## SYNOPSIS

```
days := GregorianDayDiff(day1,month1,year1,day2,month2,year2);
```

```
PROCEDURE GregorianDayDiff(day1,month1 : SHORTCARD; year1 : INTEGER;
    day2,month2 : SHORTCARD; year2 : INTEGER) : LONGINT;
```

## FUNCTION

GregorianDayDiff gives you back the number of days between two specified dates.

## INPUTS

```
day1    - day of the first date
month1  - month of the first date
year1   - year of the first date
day2    - day of the second date
month2  - month of the second month
year2   - year of the second date
```

## RESULT

days - The number of days between the two dates  
(positive if date1 <= date2).

## EXAMPLE

```
...
days := GregorianDayDiff(18,9,1970,22,1,1994);
WriteString("Age of Kai Hofmann in days : ");
WriteInt(days,10); WriteLn;
...
```

## NOTES

It is better only to use this function for years from -7 to 3200!

## BUGS

If you use on of the dates 5.10.1582 to 14.10.1582 you will get a wrong output, because this days don't exist!

## SEE ALSO

```
JulianDayDiff(), HeisDayDiff(), GregorianDaySmaller(),
GregorianDayGreater(), GregorianMonthDays(), GregorianYearDays()
```

## 1.5 Date/GregorianDayGreater

## NAME

GregorianDayGreater -- Checks if date1 is greater than date2. (V33)

## SYNOPSIS

```
greater := GregorianDayGreater(day1,month1,year1,day2,month2,year2);
```

```
PROCEDURE GregorianDayGreater(day1,month1 : SHORTCARD;
    year1 : INTEGER; day2,month2 : SHORTCARD;
    year2 : INTEGER) : BOOLEAN;
```

## FUNCTION

GregorianDayGreater test if date1 is greater than date2.

```

INPUTS
day1    - day of the first date
month1  - month of the first date
year1   - year of the first date
day2    - day of the second date
month2  - month of the second month
year2   - year of the second date

RESULT
greater - This is TRUE is date1 > date2 otherwise it's FALSE.

EXAMPLE
...
IF GregorianDayGreater(18,9,1970,22,1,1994) THEN
  WriteString(">"); WriteLn;
ELSE
  WriteString("<="); WriteLn;
END;
...

NOTES
It is better only to use this function for years from -7 to 3200!

BUGS
No known bugs.

SEE ALSO
JuliandayGreater(), HeisDayGreater()

```

## 1.6 Date/GregorianDaysAfterWeekday

```

NAME
GregorianDaysAfterWeekday -- Returns the diff to wday after. (V33)

SYNOPSIS
days := GregorianDaysAfterWeekday(day,month,year,weekday);

PROCEDURE GregorianDaysAfterWeekday(day,month : SHORTCARD;
  year : INTEGER; weekday : Weekdays) : SHORTCARD;

FUNCTION
Returns the days to the weekday after the specified date.
So if you specify the 22.1.1994 (Saturday) and Thursday
you get back 5!
If you specify the 22.1.1994 and Saturday you get back 0
(the same day)!

INPUTS
day      - day of the date
month    - month of the date
year     - year of the date
weekday  - weekday to search for building difference

RESULT
days - The days after to the searched weekday.

```

---

## EXAMPLE

```
...
days := GregorianDaysAfterWeekday(22,1,1994,Thursday);
...
```

## NOTES

It is better to use this function only from -7 to 3200!

## BUGS

See GregorianWeekday()!

## SEE ALSO

JulianDaysAfterWeekday(), HeisDaysAfterWeekday(), GregorianWeekday()

## 1.7 Date/GregorianDaysBeforeWeekday

## NAME

GregorianDaysBeforeWeekday -- Returns the diff to wday before. (V33)

## SYNOPSIS

```
days := GregorianDaysBeforeWeekday(day,month,year,weekday);
```

```
PROCEDURE GregorianDaysBeforeWeekday(day,month : SHORTCARD;
    year : INTEGER; weekday : Weekdays) : SHORTCARD;
```

## FUNCTION

Returns the days to the weekday before the specified date.  
 So if you specify the 22.1.1994 (Saturday) and Thursday  
 you get back 2!  
 If you specify the 22.1.1994 and Saturday you get back 0  
 (the same day)!

## INPUTS

```
day      - day of the date
month    - month of the date
year     - year of the date
weekday  - weekday to search for building difference
```

## RESULT

```
days - The days back to the searched weekday (1-7)
      - If you get back 8 an error occurs!
```

## EXAMPLE

```
...
days := GregorianDaysBeforeWeekday(22,1,1994,Thursday);
...
```

## NOTES

It is better to use this function only from -7 to 3200!

## BUGS

See GregorianWeekday()!

## SEE ALSO

JulianDaysBeforeWeekday(), HeisDaysBeforeWeekday(), GregorianWeekday()

## 1.8 Date/GregorianDaySmaller

### NAME

GregorianDaySmaller -- Checks if date1 is smaller than date2. (V33)

### SYNOPSIS

```
smaller := GregorianDaySmaller(day1, month1, year1, day2, month2, year2);
```

```
PROCEDURE GregorianDaySmaller(day1, month1 : SHORTCARD;
```

```
    year1 : INTEGER; day2, month2 : SHORTCARD;
```

```
    year2 : INTEGER) : BOOLEAN;
```

### FUNCTION

GregorianDaySmaller test if date1 is smaller than date2.

### INPUTS

day1 - day of the first date

month1 - month of the first date

year1 - year of the first date

day2 - day of the second date

month2 - month of the second month

year2 - year of the second date

### RESULT

smaller - This is TRUE is date1 < date2 otherwise it's FALSE.

### EXAMPLE

...

```
IF GregorianDaySmaller(18, 9, 1970, 22, 1, 1994) THEN
```

```
    WriteString("<"); WriteLn;
```

```
ELSE
```

```
    WriteString(">="); WriteLn;
```

```
END;
```

...

### NOTES

It is better only to use this function for years from -7 to 3200!

### BUGS

No known bugs.

### SEE ALSO

JulianDaySmaller(), HeisDaySmaller()

## 1.9 Date/GregorianDiffDate

### NAME

GregorianDiffDate -- Returns the diff date to another date. (V33)

### SYNOPSIS

```
GregorianDiffDate(day,month,year,diffdays,dday,dmonth,dyear);
```

```
PROCEDURE GregorianDiffDate(day,month : SHORTCARD;  
    year,days : INTEGER; VAR dday,dmonth : SHORTCARD;  
    VAR dyear : INTEGER);
```

#### FUNCTION

Returns the date wich lies diffdays before/after the specified date.

#### INPUTS

day - day of the date  
month - month of the date  
year - year of the date  
diffdays - difference to the date in days

#### RESULT

dday - Destination day  
dmonth - Destination month  
dyear - Destination year

#### EXAMPLE

```
...  
GregorianDiffDate(23,1,1994,7,dday,dmonth,dyear);  
...
```

#### NOTES

It is better to use this function only from -7 to 3200!

#### BUGS

unknown.

#### SEE ALSO

GregorianDayDiff(), JulianDiffDate(), HeisDiffDate()

## 1.10 Date/GregorianEaster

#### NAME

GregorianEaster -- Returns the date of eastern in a year (V33)

#### SYNOPSIS

```
GregorianEaster(year,dday,dmonth);
```

```
PROCEDURE GregorianEaster(year : INTEGER;  
    VAR dday,dmonth : SHORTCARD);
```

#### FUNCTION

Returns the date of eastern for a specified year.

#### INPUTS

year - eastern is calculated for this year

#### RESULT

dday - day of easter-Sunday  
dmonth - month of easter-Sunday

---

```
EXAMPLE
...
GregorianEaster(1994, dday, dmonth);
...
```

```
NOTES
Use this only for 1900 to 2099!
Tested for 1977-1994! But this formula is from Gauß - so it must be
correct :)
```

```
BUGS
None.
```

```
SEE ALSO
GEP(), GregorianJHSB()
```

## 1.11 Date/GregorianLeapYear

```
NAME
GregorianLeapYear -- Checks if a year is a leap year. (V33)
```

```
SYNOPSIS
leapyear := GregorianLeapYear(year);
```

```
PROCEDURE GregorianLeapYear(year : INTEGER) : BOOLEAN;
```

```
FUNCTION
GregorianLeapYear checks if a year is a leap year.
For years after 1582 all years devideable by 4 are leap years,
without years devideable by 100, but years devideable by 400
are leap years again!
For years before 1582 see JulianLeapYear().
```

```
INPUTS
year - The year which should be checked (from -32768 to 32767)
      I think only values from -7 to 3200 are valid, because of
      the variant that was done on -8 by Augustus and other things!
```

```
RESULT
leapyear - TRUE if the year is a leap year, otherwise false.
```

```
EXAMPLE
...
IF GregorianLeapYear(1994) THEN
  WriteString("leap year!");
ELSE
  WriteString("no leap year!");
END;
WriteLn;
...
```

```
NOTES
A year is 365.2425 days long!
Use this function only for values from -7 to 3199
```

---

BUGS  
No known bugs.

SEE ALSO  
JulianLeapYear(), HeisLeapYear()

## 1.12 Date/GregorianMonthDays

NAME  
GregorianMonthDays -- Gives back the number of days of a month. (V33)

SYNOPSIS  
days := GregorianMonthDays(month, year);

PROCEDURE GregorianMonthDays(month : SHORTCARD;  
year : INTEGER) : SHORTCARD;

FUNCTION  
GregorianMonthDays gives you back the number of days a month in a specified year has.  
For the year 1582 and the month 10 there are only 21 days, because of the Gregorian-reform 10 days are delete from the month (for more - look out for books about this!)

INPUTS  
month - The month from wich you want to get the number of days.  
year - The year in which the month is.

RESULT  
days - The number of days the month uses, or 0 if you use a wrong month.

EXAMPLE  
...  
days := GregorianMonthDays(1, 1994);  
WriteString("Days of January 1994 : ");  
WriteCard(days, 2); WriteLn;  
...

NOTES  
Use this function only for years from -7 to 3199!

BUGS  
If the reform in a country is not in the same month an error will occur!

SEE ALSO  
GregorianLeapYear(), JulianMonthDays(), HeisMonthDays()

## 1.13 Date/GregorianMoonAge

---

NAME  
GregorianMoonAge -- Returns the age of the moon (V33)

SYNOPSIS  
ep := GregorianMoonAge(day,month,year);

PROCEDURE GregorianMoonAge(day,month : SHORTCARD;  
year : CARDINAL) : SHORTCARD;

FUNCTION  
Returns the age of the moon on a specified date.

INPUTS  
day - For this day the age is calculated.  
month - For this month the age is calculated.  
year - For this year the age is calculated.

RESULT  
ep - The age of the moon on the specified date.

EXAMPLE  
...  
ep := GregorianMoonAge(18,9,1994);  
...

NOTES  
Use this only for 1582 to 4100!  
This is only a experimental version!

BUGS  
unknown.

SEE ALSO  
MoonMonthAge(),GregorianEP()

## 1.14 Date/GregorianToJD

NAME  
GregorianToJD -- Returns the JD for a date. (V33)

SYNOPSIS  
jd := GregorianToJD(day,month,year);

PROCEDURE GregorianToJD(day,month : SHORTCARD;  
year : INTEGER) : LONGCARD;

FUNCTION  
Returns the JD for a Gregorian date.

INPUTS  
day - day of the date to convert  
month - month of the date to convert  
year - year of the date to convert

---

RESULT  
jd - This is the JD

EXAMPLE  
...  
jd := GregorianToJD(23,1,1994);  
...

NOTES  
It is better to use this function only from -7 to 3200!

BUGS  
unknown.

SEE ALSO  
JulianToJD(), HeisToJD(), GSYearToJD(), GYearToScaliger(),  
GregorianDayDiff()

## 1.15 Date/GregorianWeek

NAME  
GregorianWeek -- Gets the weeknumber of a specified date. (V33)

SYNOPSIS  
weeknr := GregorianWeek(day,month,year);

PROCEDURE GregorianWeek(day,month : SHORTCARD;  
year : INTEGER) : SHORTCARD;

FUNCTION  
GregorianWeek gets the weeknumber for a specified date.

INPUTS  
day - day of the date  
month - month of the date  
year - year of the date

RESULT  
week - This is the number of the week the specified date lies in.  
If the first day in a new year is a Friday, Saturday or  
Sunday, this would be the last week of the last year!  
If the 29.12. is a Monday, the 30.12. is a Monday or a Tuesday,  
the 31.12. is a Monday, Tuesday or a Wednesday this is the  
first week of the next year!

EXAMPLE  
...  
weeknr := GregorianWeek(4,10,1582);  
...

NOTES  
It is is better only to use this function for years from 0 to 3000!

BUGS  
For years < 0 errors could occur.

SEE ALSO  
 JulianWeek(), HeisWeek(), GregorianDaySmaller(), GregorianWeekday(),  
 GregorianDayDiff()

## 1.16 Date/GregorianWeekday

NAME  
 GregorianWeekday -- Gets the weekday of a specified date. (V33)

SYNOPSIS  
 weekday := GregorianWeekday(day,month,year);

PROCEDURE GregorianWeekday(day,month : SHORTCARD;  
 year : INTEGER) : Weekday;

FUNCTION  
 GregorianWeekday gets the weekday for a specified date.

INPUTS  
 day - day of the date  
 month - month of the date  
 year - year of the date

RESULT  
 weekday - This result is of type:  
 Weekdays = (dayerr,Monday,Tuesday,Wednesday,Thursday,Friday,  
 Saturday,Sunday);  
 dayerr will show you, that an error occurs!

EXAMPLE  
 ...  
 weekday := GregorianWeekday(22,1,1994);  
 IF weekday = dayerr THEN  
 ...  
 END;  
 ...

NOTES  
 It is better only to use this function for years from -7 to 3200!  
 In this version dayerr will only occur for the 10 lost days :)

BUGS  
 It's not possible to use years < 0 (for more see JulianWeekday()).

SEE ALSO  
 JulianWeekday(), HeisWeekday(), GregorianDaySmaller(),  
 GregorianLeapYear()

## 1.17 Date/GregorianYearDays

NAME  
GregorianYearDays -- Gives back the number of days in a year. (V33)

SYNOPSIS  
days := GregorianYearDays(year);

PROCEDURE GregorianYearDays(year : INTEGER) : CARDINAL;

FUNCTION  
GregorianYearDays gives you back the number of days in a specified year.

INPUTS  
year - The year in which to count the days.

RESULT  
days - The number of days the year uses.

EXAMPLE  
...  
days := GregorianYearDays(1994);  
WriteString("Days of 1994 : ");  
WriteCard(days,3); WriteLn;  
...

NOTES  
It is better only to use this function for years from -7 to 3199!

BUGS  
No known bugs.

SEE ALSO  
GregorianMonthDays(), JulianYearDays(), HeisYearDays()

## 1.18 Date/GSYearToJD

NAME  
GSYearToJD -- Calcs the JD from a Scaliger year. (V33)

SYNOPSIS  
jd := GSYearToJD(syear);

PROCEDURE GSYearToJD(syear : CARDINAL) : LONGCARD;

FUNCTION  
Returns the Julianday of a Scaliger year.

INPUTS  
syear - Scaliger year

RESULT  
jd - The Julianday

EXAMPLE

---

```
...
jd := GYearToJD(4800);
...

NOTES
It is better to use this function only from 4707 to 7981!

BUGS
unknown.

SEE ALSO
JYearToJD(), HYearToJD(), GregorianDayDiff(), ScaligerYearToG()
```

## 1.19 Date/GYearToScaliger

```
NAME
GYearToScaliger -- Returns the year as Scaliger year. (V33)

SYNOPSIS
syear := GYearToScaliger(year);

PROCEDURE GYearToScaliger(year : INTEGER) : CARDINAL;

FUNCTION
Returns the Scaliger year.

INPUTS
year      - Gregorian year

RESULT
syear - The Scaliger year

EXAMPLE
...
syear := GYearToScaliger(1994);
...

NOTES
It is better to use this function only from -7 to 3200!

BUGS
unknown.

SEE ALSO
JYearToScaliger(), HYearToScaliger()
```

## 1.20 Date/HeisDayDiff

```
NAME
HeisDayDiff -- Calculates the days between 2 dates. (V33)

SYNOPSIS
```

---

```
days := HeisDayDiff(day1,month1,year1,day2,month2,year2);
```

```
PROCEDURE HeisDayDiff(day1,month1 : SHORTCARD; year1 : INTEGER;
    day2,month2 : SHORTCARD; year2 : INTEGER) : LONGINT;
```

FUNCTION  
HeisDayDiff gives you back the number of days between two specified dates.

INPUTS  
day1 - day of the first date  
month1 - month of the first date  
year1 - year of the first date  
day2 - day of the second date  
month2 - month of the second month  
year2 - year of the second date

RESULT  
days - The number of days between the two dates  
(positive if date1 <= date2).

EXAMPLE  
...  
days := HeisDayDiff(18,9,1970,22,1,1994);  
WriteString("Age of Kai Hofmann in days : ");  
WriteInt(days,10); WriteLn;  
...

NOTES  
It is better only to use this function for years from -7 to 8000!

BUGS  
If you use on of the dates 5.10.1582 to 14.10.1582 you will get a wrong output, because this days don't exist!

SEE ALSO  
JulianDayDiff(),GregorianDayDiff(),HeisDaySmaller(),HeisDayGreater(),  
HeisMonthDays(),HeisYearDays()

## 1.21 Date/HeisDayGreater

NAME  
HeisDayGreater -- Checks if date1 is greater than date2. (V33)

SYNOPSIS  
greater := HeisDayGreater(day1,month1,year1,day2,month2,year2);

```
PROCEDURE HeisDayGreater(day1,month1 : SHORTCARD; year1 : INTEGER;
    day2,month2 : SHORTCARD; year2 : INTEGER) : BOOLEAN;
```

FUNCTION  
HeisDayGreater test if date1 is greater than date2.

INPUTS  
day1 - day of the first date

```

month1 - month of the first date
year1  - year of the first date
day2   - day of the second date
month2 - month of the second month
year2  - year of the second date

```

RESULT

greater - This is TRUE is date1 > date2 otherwise it's FALSE.

EXAMPLE

```

...
IF HeisDayGreater(18,9,1970,22,1,1994) THEN
  WriteString(">"); WriteLn;
ELSE
  WriteString("<="); WriteLn;
END;
...

```

NOTES

It is better only to use this function for years from -7 to 8000!

BUGS

No known bugs.

SEE ALSO

JulianDayGreater(),GregorianDayGreater()

## 1.22 Date/HeisDaysAfterWeekday

NAME

HeisDaysAfterWeekday -- Returns the diff to the wday after. (V33)

SYNOPSIS

```
days := HeisDaysAfterWeekday(day,month,year,weekday);
```

```
PROCEDURE HeisDaysAfterWeekday(day,month : SHORTCARD;
  year : INTEGER; weekday : Weekdays) : SHORTCARD;
```

FUNCTION

Returns the days to the weekday after the specified date.  
 So if you specify the 22.1.1994 (Saturday) and Thursday  
 you get back 5!  
 If you specify the 22.1.1994 and Saturday you get back 0  
 (the same day)!

INPUTS

```

day      - day of the date
month    - month of the date
year     - year of the date
weekday  - weekday to search for building difference

```

RESULT

days - The days after to the searched weekday.

EXAMPLE

```
...
days := HeisDaysAfterWeekday(22,1,1994,Thursday);
...
```

#### NOTES

It is better to use this function only from -7 to 8000!

#### BUGS

See HeisWeekday()!

#### SEE ALSO

JulianDaysAfterWeekday(), GregorianDaysAfterWeekday(), HeisWeekday()

## 1.23 Date/HeisDaysBeforeWeekday

#### NAME

HeisDaysBeforeWeekday -- Returns the diff to wday before. (V33)

#### SYNOPSIS

```
days := HeisDaysBeforeWeekday(day,month,year,weekday);
```

```
PROCEDURE HeisDaysBeforeWeekday(day,month : SHORTCARD;
    year : INTEGER; weekday : Weekdays) : SHORTCARD;
```

#### FUNCTION

Returns the days to the weekday before the specified date.  
 So if you specify the 22.1.1994 (Saturday) and Thursday  
 you get back 2!  
 If you specify the 22.1.1994 and Saturday you get back 0  
 (the same day)!

#### INPUTS

```
day      - day of the date
month    - month of the date
year     - year of the date
weekday  - weekday to search for building difference
```

#### RESULT

```
days - The days back to the searched weekday (1-7)
      - If you get back 8 an error occurs!
```

#### EXAMPLE

```
...
days := HeisDaysBeforeWeekday(22,1,1994,Thursday);
...
```

#### NOTES

It is better to use this function only from -7 to 8000!

#### BUGS

See HeisWeekday()!

#### SEE ALSO

JulianDaysBeforeWeekday(), GregorianDaysBeforeWeekday(), HeisWeekday()

## 1.24 Date/HeisDaySmaller

### NAME

HeisDaySmaller -- Checks if date1 is smaller than date2. (V33)

### SYNOPSIS

```
smaller := HeisDaySmaller(day1,month1,year1,day2,month2,year2);
```

```
PROCEDURE HeisDaySmaller(day1,month1 : SHORTCARD; year1 : INTEGER;
    day2,month2 : SHORTCARD; year2 : INTEGER) : BOOLEAN;
```

### FUNCTION

HeisDaySmaller test if date1 is smaller than date2.

### INPUTS

day1 - day of the first date  
month1 - month of the first date  
year1 - year of the first date  
day2 - day of the second date  
month2 - month of the second month  
year2 - year of the second date

### RESULT

smaller - This is TRUE is date1 < date2 otherwise it's FALSE.

### EXAMPLE

```
...
IF HeisDaySmaller(18,9,1970,22,1,1994) THEN
    WriteString("<"); WriteLn;
ELSE
    WriteString(">="); WriteLn;
END;
...
```

### NOTES

It is better only to use this function for years from -7 to 8000!

### BUGS

No known bugs.

### SEE ALSO

JulianDaySmaller(),GregorianDaySmaller()

## 1.25 Date/HeisDiffDate

### NAME

HeisDiffDate -- Returns the date for a diff to another date. (V33)

### SYNOPSIS

```
HeisDiffDate(day,month,year,diffdays,dday,dmonth,dyear);
```

```
PROCEDURE HeisDiffDate(day,month : SHORTCARD; year,days : INTEGER;
    VAR dday,dmonth : SHORTCARD; VAR dyear : INTEGER);
```

FUNCTION  
Returns the date wich lies diffdays before/after the specified date.

INPUTS  
day - day of the date  
month - month of the date  
year - year of the date  
diffdays - difference to the date in days

RESULT  
dday - Destination day  
dmonth - Destination month  
dyear - Destination year

EXAMPLE  
...  
HeisDiffDate(23,1,1994,7,dday,dmonth,dyear);  
...

NOTES  
It is better to use this function only from -7 to 8000!

BUGS  
unknown.

SEE ALSO  
HeisDayDiff(), JulianDiffDate(), GregorianDiffDate()

## 1.26 Date/HeisLeapYear

NAME  
HeisLeapYear -- Checks if a year is a leap year. (V33)

SYNOPSIS  
leapyear := HeisLeapYear(year);

PROCEDURE HeisLeapYear(year : INTEGER) : BOOLEAN;

FUNCTION  
HeisLeapYear checks if a year is a leap year.  
For years after 1582 see GregorianLeapYear(),  
The correction from N. Heis says, that all years devideable by  
3200 are no longer leap years!  
For years before 1582 see JulianLeapYear

INPUTS  
year - The year which should be checked (from -32768 to 32767)  
I think only values from -7 to 8000 are valid, because of  
the variant that was done on -8 by Augustus and other things!

RESULT  
leapyear - TRUE if the year is a leap year, otherwise false.

EXAMPLE  
...

```

IF HeisLeapYear(1994) THEN
  WriteString("leap year!");
ELSE
  WriteString("no leap year!");
END;
WriteLn;
...

NOTES
A year is now 365.2421875 days!
Use this function only for values from -7 to 8000!

BUGS
No known bugs.

SEE ALSO
JulianLeapYear(),GregorianLeapYear()

```

## 1.27 Date/HeisMonthDays

```

NAME
HeisMonthDays -- Gives back the number of days of a month. (V33)

SYNOPSIS
days := HeisMonthDays(month,year);

PROCEDURE HeisMonthDays(month : SHORTCARD;
  year : INTEGER) : SHORTCARD;

FUNCTION
HeisMonthDays gives you back the number of days a month in
a specified year has.
For the year 1582 and the month 10 there are only 21 days,
because of the Gregorian-reform 10 days are delete from
the month (for more - look out for books about this!)

INPUTS
month - The month from wich you want to get the number of days.
year - The year in which the month is.

RESULT
days - The number of days the month uses, or 0 if you use
a wrong month.

EXAMPLE
...
days := HeisMonthDays(1,1994);
WriteString("Days of January 1994 : ");
WriteCard(days,2); WriteLn;
...

NOTES
Use this function only for years from -7 to 8000!

BUGS

```

See `GregorianMonthDays!`

SEE ALSO  
`HeisLeapYear()`, `JulianMonthDays()`, `GregorianMonthDays()`

## 1.28 Date/HeisToJD

NAME  
`HeisToJD` -- Returns the JD for a date. (V33)

SYNOPSIS  
`jd := HeisToJD(day,month,year);`

PROCEDURE `HeisToJD`(`day,month` : SHORTCARD;  
                  `year` : INTEGER) : LONGCARD;

FUNCTION  
Returns the JD for a Heis date.

INPUTS  
`day`        - day of the date to convert  
`month`      - month of the date to convert  
`year`       - year of the date to convert

RESULT  
`jd` - This is the JD

EXAMPLE  
...  
`jd := HeisToJD(23,1,1994);`  
...

NOTES  
It is better to use this function only from -7 to 3268!

BUGS  
unknown.

SEE ALSO  
`JulianToJD()`, `GregorianToJD()`, `HSYearToJD()`, `HYearToScaliger()`,  
`HeisDayDiff()`

## 1.29 Date/HeisWeek

NAME  
`HeisWeek` -- Gets the weeknumber of a specified date. (V33)

SYNOPSIS  
`weeknr := HeisWeek(day,month,year);`

PROCEDURE `HeisWeek`(`day,month` : SHORTCARD;  
                  `year` : INTEGER) : SHORTCARD;

---

```

FUNCTION
HeisWeek gets the weeknumber for a specified date.

INPUTS
day   - day of the date
month - month of the date
year  - year of the date

RESULT
week - This is the number of the week the specified date lies in.
      If the first day in a new year is a Friday, Saturday or
      Sunday, this would be the last week of the last year!
      If the 29.12. is a Monday, the 30.12. is a Monday or a Tuesday,
      the 31.12. is a Monday, Tuesday or a Wednesday this is the
      first week of the next year!

EXAMPLE
...
weeknr := HeisWeek(4,10,1582);
...

NOTES
It is is better only to use this function for years from 0 to 8000!

BUGS
For years < 0 errors could occur.

SEE ALSO
JulianWeek(),GregorianWeek(),HeisDayDiff(),HeisDaySmaller(),
HeisWeekday()

```

### 1.30 Date/HeisWeekday

```

NAME
HeisWeekday -- Gets the weekday of a specified date. (V33)

SYNOPSIS
weekday := HeisWeekday(day,month,year);

PROCEDURE HeisWeekday(day,month : SHORTCARD;
                      year : INTEGER) : Weekday;

FUNCTION
HeisWeekday gets the weekday for a specified date.

INPUTS
day   - day of the date
month - month of the date
year  - year of the date

RESULT
weekday - This result is of type:
          Weekdays = (dayerr,Monday,Tuesday,Wednesday,Thursday,Friday,
                      Saturday,Sunday);

```

---

dayerr will show you, that an error occurs!

```
EXAMPLE
...
weekday := HeisWeekday(22,1,1994);
IF weekday = dayerr THEN
...
END;
...
```

NOTES  
It is better only to use this function for years from -7 to 8000!  
In this version dayerr will only occur for the 10 lost days :)

BUGS  
It is not possible to use year < 0 (see JulianWeekday() for more).

SEE ALSO  
JulianWeekday(), GregorianWeekday(), HeisDaySmaller(), HeisLeapYear(),  
HeisDayDiff()

## 1.31 Date/HeisYearDays

NAME  
HeisYearDays -- Gives back the number of days in a year. (V33)

SYNOPSIS  
days := HeisYearDays(year);

PROCEDURE HeisYearDays(year : INTEGER) : CARDINAL;

FUNCTION  
HeisYearDays gives you back the number of days in  
a specified year.

INPUTS  
year - The year in which to count the days.

RESULT  
days - The number of days the year uses.

```
EXAMPLE
...
days := HeisYearDays(1994);
WriteString("Days of 1994 : ");
WriteCard(days,3); WriteLn;
...
```

NOTES  
It is better only to use this function for years from -7 to 8000!

BUGS  
No known bugs.

SEE ALSO

HeisMonthDays(), JulianYearDays(), GregorianYearDays()

## 1.32 Date/HSYearToJD

### NAME

HSYearToJD -- Calcs the JD from a Scaliger year. (V33)

### SYNOPSIS

```
jd := HSYearToJD(syear);
```

```
PROCEDURE HSYearToJD(syear : CARDINAL) : LONGCARD;
```

### FUNCTION

Returns the Julianday of a Scaliger year.

### INPUTS

syear - Scaliger year

### RESULT

jd - The Julianday

### EXAMPLE

```
...  
jd := HSYearToJD(6700);  
...
```

### NOTES

It is better to use this function only from 4707 to 7981!  
In this version only GYearToJD() is called, because the  
Scaliger period is only valid to 3268

### BUGS

unknown.

### SEE ALSO

JYearToJD(), GYearToJD()

## 1.33 Date/HYearToScaliger

### NAME

HYearToScaliger -- Returns the year as Scaliger year. (V33)

### SYNOPSIS

```
syear := HYearToScaliger(year);
```

```
PROCEDURE HYearToScaliger(year : INTEGER) : CARDINAL;
```

### FUNCTION

Returns the Scaliger year.

### INPUTS

year - Heis year

---

RESULT  
syear - The Scaliger year

EXAMPLE  
...  
syear := HYearToScaliger(1994);  
...

NOTES  
It is better to use this function only from -7 to 8000!

BUGS  
The Scaliger period is defined to 3268!!!.

SEE ALSO  
JYearToScaliger(), GYearToScaliger()

## 1.34 Date/JDtoMJD

NAME  
JDtoMJD -- Switches from JD to MJD. (V33)

SYNOPSIS  
mjd := JDtoMJD(jd);

PROCEDURE JDtoMJD(jd : LONGCARD) : LONGCARD;

FUNCTION  
Returns the Modified Julianday of a Julianday.

INPUTS  
jd - Julianday

RESULT  
mjd - The Modified Julianday

EXAMPLE  
...  
mjd := JDtoMJD(2449354);  
...

NOTES  
none

BUGS  
Only use this function for  $jd > 2400001$ , because mjd is only defined for this, otherwise system will crash!

SEE ALSO  
MJDtoJD()

---

## 1.35 Date/JDToTime

NAME  
JDToTime -- Returns the real time for a JD time. (V33)

SYNOPSIS  
JDToTime(jd, rhour, rmin, rsec);

PROCEDURE JDToTime(jd : REAL; VAR rhour, rmin, rsec : SHORTCARD);

FUNCTION  
Returns the real time for a JD time.

INPUTS  
jd - JD time

RESULT  
rhour - 24 hour real time  
rmin - real minutes  
rsec - real seconds

EXAMPLE  
...  
JDToTime(0.76543, rhour, rmin, rsec);  
...

NOTES  
none.

BUGS  
If jd is > 0 (including days) there will be occur arithmetic bugs!

SEE ALSO  
TimeToJD()

## 1.36 Date/JSYearToJD

NAME  
JSYearToJD -- Calcs the JD from a Scaliger year. (V33)

SYNOPSIS  
jd := JSYearToJD(syear);

PROCEDURE JSYearToJD(syear : CARDINAL) : LONGCARD;

FUNCTION  
Returns the Julianday of a Scaliger year.

INPUTS  
syear - Scaliger year

RESULT  
jd - The Julianday

---

```
EXAMPLE
...
jd := JSYearToJD(4800);
...
```

NOTES  
It is better to use this function only from 4707 to 6295!

BUGS  
unknown.

SEE ALSO  
GSYearToJD(), HSYearToJD()

## 1.37 Date/JulianDayDiff

NAME  
JulianDayDiff -- Calculates the days between 2 dates. (V33)

SYNOPSIS  
days := JulianDayDiff(day1,month1,year1,day2,month2,year2);

PROCEDURE JulianDayDiff(day1,month1 : SHORTCARD; year1 : INTEGER;  
day2,month2 : SHORTCARD; year2 : INTEGER) : LONGINT;

FUNCTION  
JulianDayDiff gives you back the number of days between  
two specified dates.

INPUTS  
day1 - day of the first date  
month1 - month of the first date  
year1 - year of the first date  
day2 - day of the second date  
month2 - month of the second month  
year2 - year of the second date

RESULT  
days - The number of days between the two dates  
(positive if date1 <= date2).

```
EXAMPLE
...
days := JulianDayDiff(18,9,1970,22,1,1994);
WriteString("Age of Kai Hofmann in days : ");
WriteInt(days,10); WriteLn;
...
```

NOTES  
It is better only to use this function for years from -7 to 1582!

BUGS  
No known bugs.

SEE ALSO

---

GregorianDayDiff(), HeisDayDiff(), JulianMonthDays(), JulianYearDays()

## 1.38 Date/JulianDayGreater

### NAME

JulianDayGreater -- Checks if date1 is greater than date2. (V33)

### SYNOPSIS

```
greater := JulianDayGreater(day1,month1,year1,day2,month2,year2);
```

```
PROCEDURE JulianDayGreater(day1,month1 : SHORTCARD; year1 : INTEGER;
    day2,month2 : SHORTCARD; year2 : INTEGER) : BOOLEAN;
```

### FUNCTION

JulianDayGreater test if date1 is greater than date2.

### INPUTS

```
day1    - day of the first date
month1  - month of the first date
year1   - year of the first date
day2    - day of the second date
month2  - month of the second month
year2   - year of the second date
```

### RESULT

greater - This is TRUE is date1 > date2 otherwise it's FALSE.

### EXAMPLE

```
...
IF JulianDayGreater(18,9,1970,22,1,1994) THEN
    WriteString(">"); WriteLn;
ELSE
    WriteString("<="); WriteLn;
END;
...
```

### NOTES

It is better only to use this function for years from -7 to 1582!

### BUGS

No known bugs.

### SEE ALSO

GregorianDayGreater(), HeisDayGreater()

## 1.39 Date/JulianDaysAfterWeekday

### NAME

JulianDaysAfterWeekday -- Returns the diff to the wday after. (V33)

### SYNOPSIS

```
days := JulianDaysAfterWeekday(day,month,year,weekday);
```

```
PROCEDURE JulianDaysAfterWeekday(day,month : SHORTCARD;
    year : INTEGER; weekday : Weekdays) : SHORTCARD;
```

#### FUNCTION

Returns the days to the weekday after the specified date.  
So if you specify the 22.1.1994 (Saturday) and Thursday  
you get back 5!  
If you specify the 22.1.1994 and Saturday you get back 0  
(the same day)!

#### INPUTS

day - day of the date  
month - month of the date  
year - year of the date  
weekday - weekday to search for building difference

#### RESULT

days - The days after to the searched weekday.

#### EXAMPLE

```
...
days := JulianDaysAfterWeekday(22,1,1994,Thursday);
...
```

#### NOTES

It is better to use this function only from -7 to 1582!

#### BUGS

See JulianWeekday()!

#### SEE ALSO

GregorianDaysAfterWeekday(), HeisDaysAfterWeekday(), JulianWeekday()

## 1.40 Date/JulianDaysBeforeWeekday

#### NAME

JulianDaysBeforeWeekday -- Returns the diff to the wday before. (V33)

#### SYNOPSIS

```
days := JulianDaysBeforeWeekday(day,month,year,weekday);
```

```
PROCEDURE JulianDaysBeforeWeekday(day,month : SHORTCARD;
    year : INTEGER; weekday : Weekdays) : SHORTCARD;
```

#### FUNCTION

Returns the days to the weekday before the specified date.  
So if you specify the 22.1.1994 (Saturday) and Thursday  
you get back 2!  
If you specify the 22.1.1994 and Saturday you get back 0  
(the same day)!

#### INPUTS

day - day of the date  
month - month of the date

year - year of the date  
 weekday - weekday to search for building difference

RESULT

days - The days back to the searched weekday (0-6)  
 If you get back 8 an error occurs!

EXAMPLE

```
...
days := JulianDaysBeforeWeekday(22,1,1994,Thursday);
...
```

NOTES

It is better to use this function only from -7 to 1582!

BUGS

See JulianWeekday()!

SEE ALSO

GregorianDaysBeforeWeekday(), HeisDaysBeforeWeekday(), JulianWeekday()

## 1.41 Date/JulianDaySmaller

NAME

JulianDaySmaller -- Checks if date1 is smaller than date2. (V33)

SYNOPSIS

```
smaller := JulianDaySmaller(day1,month1,year1,day2,month2,year2);
```

```
PROCEDURE JulianDaySmaller(day1,month1 : SHORTCARD; year1 : INTEGER;
  day2,month2 : SHORTCARD; year2 : INTEGER) : BOOLEAN;
```

FUNCTION

JulianDaySmaller test if date1 is smaller than date2.

INPUTS

day1 - day of the first date  
 month1 - month of the first date  
 year1 - year of the first date  
 day2 - day of the second date  
 month2 - month of the second month  
 year2 - year of the second date

RESULT

smaller - This is TRUE is date1 < date2 otherwise it's FALSE.

EXAMPLE

```
...
IF JulianDaySmaller(18,9,1970,22,1,1994) THEN
  WriteString("<"); WriteLn;
ELSE
  WriteString(">="); WriteLn;
END;
...
```

## NOTES

It is better only to use this function for years from -7 to 1582!

## BUGS

No known bugs.

## SEE ALSO

GregorianDaySmaller(), HeisDaySmaller()

## 1.42 Date/JulianDiffDate

## NAME

JulianDiffDate -- Returns the date for a diff to another date. (V33)

## SYNOPSIS

JulianDiffDate(day, month, year, diffdays, dday, dmonth, dyear);

PROCEDURE JulianDiffDate(day, month : SHORTCARD; year, days : INTEGER;  
VAR dday, dmonth : SHORTCARD; VAR dyear : INTEGER);

## FUNCTION

Returns the date wich lies diffdays before/after the specified date.

## INPUTS

day - day of the date  
month - month of the date  
year - year of the date  
diffdays - difference to the date in days

## RESULT

dday - Destination day  
dmonth - Destination month  
dyear - Destination year

## EXAMPLE

...  
JulianDiffDate(23, 1, 1994, 7, dday, dmonth, dyear);  
...

## NOTES

It is better to use this function only from -7 to 1582!

## BUGS

unknown.

## SEE ALSO

GregorianDiffDate(), HeisDiffDate(), JulianDayDiff()

## 1.43 Date/JulianLeapYear

## NAME

JulianLeapYear -- Checks if a year is a leap year. (V33)

---

```
SYNOPSIS
leapyear := JulianLeapYear(year);

PROCEDURE JulianLeapYear(year : INTEGER) : BOOLEAN;

FUNCTION
JulianLeapYear checks if a year is a leap year in the julian calendar
For years after Chr. it checks if the year is devidedable by 4.
For years before Chr. a leap year must have a modulo 4 value of 1

INPUTS
year - The year which should be checked (from -32768 to 32767)
      I think only values from -7 to 1582 are valid, because of
      the variant that was done on -8 by Augustus and other things!

RESULT
leapyear - TRUE if the year is a leap year, otherwise false.

EXAMPLE
...
IF JulianLeapYear(1994) THEN
  WriteString("leap year!");
ELSE
  WriteString("no leap year!");
END;
WriteLn;
...

NOTES
A year is 365.25 days long!
Use this function only for values from -7 to 1582!

BUGS
No known bugs.

SEE ALSO
GregorianLeapYear(), HeisLeapYear()
```

## 1.44 Date/JulianMonthDays

```
NAME
JulianMonthDays -- Gives back the number of days of a month. (V33)

SYNOPSIS
days := JulianMonthDays(month, year);

PROCEDURE JulianMonthDays(month : SHORTCARD;
  year : INTEGER) : SHORTCARD;

FUNCTION
JulianMonthDays gives you back the number of days a month in
a specified year has.

INPUTS
```

---

month - The month from which you want to get the number of days.  
year - The year in which the month is.

**RESULT**

days - The number of days the month uses, or 0 if you use a wrong month.

**EXAMPLE**

```
...
days := JulianMonthDays(1,1994);
WriteString("Days of January 1994 : ");
WriteCard(days,2); WriteLn;
...
```

**NOTES**

It is better only to use this function for years from -7 to 09.1582!

**BUGS**

No known bugs.

**SEE ALSO**

JulianLeapYear(), GregorianMonthDays(), HeisMonthDays()

## 1.45 Date/JulianToJD

**NAME**

JulianToJD -- Returns the JD for a date. (V33)

**SYNOPSIS**

```
jd := JulianToJD(day,month,year);
```

```
PROCEDURE JulianToJD(day,month : SHORTCARD;
    year : INTEGER) : LONGCARD;
```

**FUNCTION**

Returns the JD for a Julian date.

**INPUTS**

day - day of the date to convert  
month - month of the date to convert  
year - year of the date to convert

**RESULT**

jd - This is the JD

**EXAMPLE**

```
...
jd := JulianToJD(23,1,1994);
...
```

**NOTES**

It is better to use this function only from -7 to 1582!

**BUGS**

unknown.

---

SEE ALSO  
GregorianToJD(), HeisToJD(), JSYearToJD(), JYearToScaliger(),  
JulianDayDiff()

## 1.46 Date/JulianWeek

NAME  
JulianWeek -- Gets the weeknumber of a specified date. (V33)

SYNOPSIS  
weeknr := JulianWeek(day,month,year);

PROCEDURE JulianWeek(day,month : SHORTCARD;  
year : INTEGER) : SHORTCARD;

FUNCTION  
JulianWeek gets the weeknumber for a specified date.

INPUTS  
day - day of the date  
month - month of the date  
year - year of the date

RESULT  
week - This is the number of the week the specified date lies in.  
If the first day in a new year is a Friday, Saturday or  
Sunday, this would be the last week of the last year!  
If the 29.12. is a Monday, the 30.12. is a Monday or a Tuesday,  
the 31.12. is a Monday, Tuesday or a Wednesday this is the  
first week of the next year!

EXAMPLE  
...  
weeknr := JulianWeek(4,10,1582);  
...

NOTES  
It is is better only to use this function for years from 0 to 1582!

BUGS  
For years < 0 errors could occur.

SEE ALSO  
GregorianWeek(), HeisWeek(), JulianWeekday(), JulianDaySmaller(),  
JulianDayDiff()

## 1.47 Date/JulianWeekday

NAME  
JulianWeekday -- Gets the weekday of a specified date. (V33)

```

SYNOPSIS
weekday := JulianWeekday(day,month,year);

PROCEDURE JulianWeekday(day,month : SHORTCARD;
    year : INTEGER) : Weekday;

FUNCTION
JulianWeekday gets the weekday for a specified date.

INPUTS
day    - day of the date
month  - month of the date
year   - year of the date

RESULT
weekday - This result is of type:
    Weekdays := (dayerr,Monday,Tuesday,Wednesday,Thursday,Friday,
    Saturday,Sunday);
    dayerr will show you, that an error occurs!

EXAMPLE
...
weekday := JulianWeekday(4,10,1582);
IF weekday = dayerr THEN
...
END;
...

NOTES
It is better only to use this function for years from 0 to 1582!
In this version no dayerr will occur!

BUGS
For years < 0 errors could occur, or systemcrashes(?).

SEE ALSO
GregorianWeekday(),HeisWeekday()

```

## 1.48 Date/JulianYearDays

```

NAME
JulianYearDays -- Gives back the number of days in a year. (V33)

SYNOPSIS
days := JulianYearDays(year);

PROCEDURE JulianYearDays(year : INTEGER) : CARDINAL;

FUNCTION
JulianYearDays gives you back the number of days in
a specified year.

INPUTS
year - The year in which to count the days.

```

---

RESULT  
days - The number of days the year uses.

EXAMPLE  
...  
days := JulianYearDays(1994);  
WriteString("Days of 1994 : ");  
WriteCard(days,3); WriteLn;  
...

NOTES  
It is better only to use this function for years from -7 to 1581!

BUGS  
No known bugs.

SEE ALSO  
JulianMonthDays(),GregorianYearDays(),HeisYearDays()

## 1.49 Date/JYearToScaliger

NAME  
JYearToScaliger -- Returns the year as Scaliger year. (V33)

SYNOPSIS  
syear := JYearToScaliger(year);

PROCEDURE JYearToScaliger(year : INTEGER) : CARDINAL;

FUNCTION  
Returns the Scaliger year.

INPUTS  
year - Julian year

RESULT  
syear - The Scaliger year

EXAMPLE  
...  
syear := JYearToScaliger(1582);  
...

NOTES  
It is better to use this function only from -7 to 1582!

BUGS  
unknown.

SEE ALSO  
GYearToScaliger(),HYearToScaliger()

---

## 1.50 Date/LMT

```
NAME
LMT -- Calculates your local time in your timezone (V33)

SYNOPSIS
secs := LMT(secs,meridian,pos);

PROCEDURE LMT(secs : LONGCARD; meridiandegree,
              posdegree : REAL) : LONGINT;

FUNCTION
Calculates your Local Mean Time of you place!

INPUTS
secs      - Seconds of the running day (hours*3600+min*60+sec)
meridian  - Degrees of your timezone-meridian
pos       - Degrees of your place

RESULT
secs - Local seconds of the running day

EXAMPLE
...
secs := LMT(76080,15.0,8.923055556);
...

NOTES
none

BUGS
No errorcheck, if you put in valid degrees (-180 to +180)

SEE ALSO
```

## 1.51 Date/MJDtoJD

```
NAME
MJDtoJD -- Switches from MJD to JD. (V33)

SYNOPSIS
jd := MJDtoJD(mjd);

PROCEDURE MJDtoJD(mjd : LONGCARD) : LONGCARD;

FUNCTION
Returns the Julianday of a Modified Julianday.

INPUTS
mjd - Modified Julianday

RESULT
jd - The Julianday
```

---

```
EXAMPLE
...
jd := JDtoMJD(49353);
...

NOTES
none

BUGS
unknown.

SEE ALSO
MJDtoJD()
```

## 1.52 Date/ScaligerYearToG

```
NAME
ScaligerYearToG -- Returns the Scaliger year as Gregorian year. (V33)

SYNOPSIS
year := ScaligerYearToG(syear);

PROCEDURE ScaligerYearToG(syear : CARDINAL) : INTEGER;

FUNCTION
Returns the Gregorian year of a Scaliger year.

INPUTS
syear      - Scaliger year

RESULT
year - The Gregorian year

EXAMPLE
...
year := ScaligerYearToG(6400);
...

NOTES
It is better to use this function only from 4707 to 7981!

BUGS
unknown.

SEE ALSO
ScaligerYearToJ(), ScaligerYearToH()
```

## 1.53 Date/ScaligerYearToH

```
NAME
ScaligerYearToH -- Returns the Scaliger year as Heis year. (V33)
```

---

```
SYNOPSIS
year := ScaligerYearToH(syear);

PROCEDURE ScaligerYearToH(syear : CARDINAL) : INTEGER;

FUNCTION
Returns the Heis year of a Scaliger year.

INPUTS
syear      - Scaliger year

RESULT
year - The Heis year

EXAMPLE
...
year := ScaligerYearToH(7000);
...

NOTES
It is better to use this function only from 4707 to 7981!

BUGS
unknown.

SEE ALSO
ScaligerYearToJ(), ScaligerYearToG()
```

## 1.54 Date/ScaligerYearToJ

```
NAME
ScaligerYearToJ -- Returns the Scaliger year as Julian year. (V33)

SYNOPSIS
year := ScaligerYearToJ(syear);

PROCEDURE ScaligerYearToJ(syear : CARDINAL) : INTEGER;

FUNCTION
Returns the Julian year of a Scaliger year.

INPUTS
syear      - Scaliger year

RESULT
year - The Julian year

EXAMPLE
...
year := ScaligerYearToJ(4800);
...

NOTES
It is better to use this function only from 4707 to 6295!
```

---

BUGS  
unknown.

SEE ALSO  
ScaligerYearToG(), ScaligerYearToH()

## 1.55 Date/SecToTime

NAME  
SecToTime -- Returns the time from seconds (V33)

SYNOPSIS  
SecToTime(secs, hour, min, sec);

PROCEDURE SecToTime(secs : LONGCARD; VAR hour, min, sec : SHORTCARD);

FUNCTION  
Gives you back the time from the specified seconds

INPUTS  
secs - Time in seconds

RESULT  
hour - hours (0-23)  
min - minutes (0-59)  
sec - seconds (0-59)

EXAMPLE  
...  
SecToTime(76860, hour, min, sec);  
...

NOTES  
Don't forget to convert 24h time to AM/PM time if needed!

BUGS  
No errorcheck, if you use a valid time

SEE ALSO  
TimeToSec()

## 1.56 Date/TimeToJD

NAME  
TimeToJD -- Returns the JD for a time. (V33)

SYNOPSIS  
jd := TimeToJD(hour, min, sec);

PROCEDURE TimeToJD(hour, min, sec : SHORTCARD) : REAL;

---

```
FUNCTION
Returns the JD for a specified time.

INPUTS
hour - hour of the time to convert
min  - minute of the time to convert
sec  - sec. of the time to convert

RESULT
jd - This is the JD time

EXAMPLE
...
jd := TimeToJD(16,33,0);
...

NOTES
none

BUGS
There is no check, if the specified time is a valid time!

SEE ALSO
JDTtoTime()
```

## 1.57 Date/TimeToSec

```
NAME
TimeToSec -- Returns the time in seconds (V33)

SYNOPSIS
secs := TimeToSec(hour,min,sec);

PROCEDURE TimeToSec(hour,min,sec : SHORTCARD) : LONGCARD;

FUNCTION
Gives you back the time in seconds

INPUTS
hour - hours you want (0-23)
min  - minutes you want (0-59)
sec  - seconds you want (0-59)

RESULT
secs - Time in seconds

EXAMPLE
...
secs := TimeToSec(21,15,00);
...

NOTES
Don't forget to convert AM/PM time to 24h time!

BUGS
```

---

No errorcheck, if you use a valid time

SEE ALSO  
SecToTime()

## 1.58 Date/TimeZoneFactor

### NAME

TimeZoneFactor -- Returns the value you have to add to GMT time (V33)

### SYNOPSIS

```
addhours := TimeZoneFactor(degrees);
```

```
PROCEDURE TimeZoneFactor(degree : SHORTINT) : SHORTINT;
```

### FUNCTION

This gives you the hours you have to add to GMT time, specified on the fact, that a timezone is 15 degrees and that GMT is centered on 0 degrees!

### INPUTS

degrees - Position of timezone you live in (from -180 to +180)

### RESULT

addhours - Time to add to GMT time to get your locale zone time (-12 to +12)

### EXAMPLE

```
...  
addhours := TimeZoneFactor(-8);  
...
```

### NOTES

none

### BUGS

No errorcheck, if you put in valid degrees (-180 to +180).  
Only full degrees are supported, keep sure that you round in the right way for 0.x degree places  
I am not sure about the correct +/- behaviour!!!

### SEE ALSO