Dates

Introduction to `lubridate`

Creating Date-Time Objects

Use these functions to make a vector a class Date.

1. `ymd()`: is a function used to create a date object from year, month, and day components.

```
my_date <- "2023-09-15"
class(my_date)
```

Output: "character"

```
my_date <- ymd(my_date)
class(my_date)
```

Output: "Date"

2. `mdy()`: is a function used to create a date object in a month-day-year format.

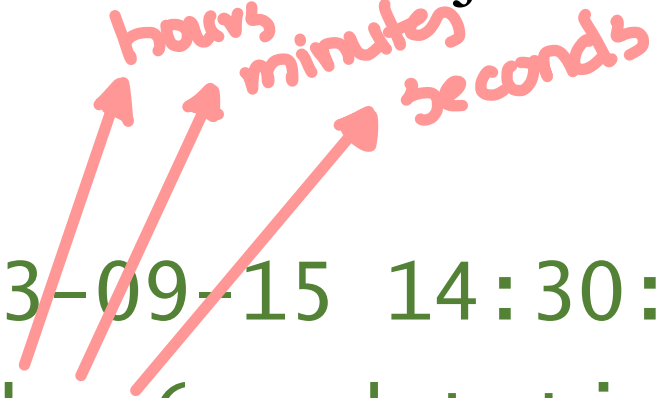

```
my_date2 <- "12-14-2023"
my_date2 <- mdy(my_date2)
my_date2
```

← printing it after changing it to a class Date.

Output: "2023-12-14"

A class Date puts year first, then month, then day

3. `ymd_hms()`: creates a date-time object with hours, minutes, and seconds.




```
my_datetime <- "2023-09-15 14:30:45"
my_datetime <- ymd_hms(my_datetime)
```

Class is "POSIXct" "POSIXt"

Extracting Components

```
my_date <- ymd("2024-10-30")
```
← turned into class Date

Extract year

```
year(my_date)
```
Output: 2024

Extract month

```
month(my_date)
```
Output: 10

Extracting Components

```
my_date <- ymd("2024-10-30")
```

Extract day

```
day(my_date)
```

Output: 30

Extract day of the week (Sunday: 1, Monday: 2, etc.)

```
wday(my_date)
```

Output: 4 ← 4 means Wednesday.

Example with a Dataframe

dwts_dates

Name	Birth	Wedding
Derek	1985-05-17	08-26-2023
Mark	1986-05-24	11-25-2016
Lindsay	1994-01-11	06-18-2015

Notice the order

Notice the order

```
class(dwts_dates$Name)
```

Output: "character"

```
class(dwts_dates$Birth)
```

Output: "character"

```
class(dwts_dates$Wedding)
```

Output: "character"

```
dwts_dates <- dwts_dates %>%
  mutate(Birth = ymd(Birth),
         Wedding = mdy(Wedding))
```

This makes the two columns become class Date

Name	Birth	Wedding
Derek	1985-05-17	2023-08-26
Mark	1986-05-24	2016-11-25
Lindsay	1994-01-11	2015-06-18

```
class(dwts_dates$Name)
```
Output: "character"

```
class(dwts_dates$Birth)
```
Output: "Date"

```
class(dwts_dates$Wedding)
```
Output: "Date"

```
dwts_info <- dwts_dates %>%
  mutate(Year = year(Birth),
         Day = day(Wedding),
         Month = month(Wedding),
         Day_Week = wday(Wedding))
```

4 New columns

Name	Birth	Wedding	Year	Day	Month	Day-Week
Derek	1985-05-17	2023-08-26	1985	26	8	7 (Sat)
Mark	1986-05-24	2016-11-25	1986	25	11	6 (Fri)
Lindsay	1994-01-11	2015-06-18	1994	18	6	5 (Th)

Arithmetic with Date-Times

Adding Days

```
my_date <- ymd("2024-10-30")
new_date <- my_date + days(7)
new_date
```

adds 7 days to the date

Output: "2024-11-06"

Finding Time Difference

```
my_date <- ymd("2024-10-30")
my_date2 <- ymd("2024-11-06")
```

Find the time difference between my_date and my_datetime

```
diff <- my_date2 - my_date
diff
```

Output: Time difference of 7 days.

as.numeric(my_date2 - my_date) Output: 7

Use difftime when the date includes time

```
time1 <- ymd_hms("2023-09-15 08:30:00")
time2 <- ymd_hms("2023-09-15 12:45:30")
```

- ***To calculate the time difference in seconds***

```
difftime(time2, time1, units = "secs")
```

Output: Time difference of 15330 secs

```
as.numeric(difftime(time2, time1, units = "secs"))
```

Output: 15330

Use difftime when the date includes time

```
time1 <- ymd_hms("2023-09-15 08:30:00")
time2 <- ymd_hms("2023-09-15 12:45:30")
```

- ***Calculate the time difference in hours***

```
difftime(time2, time1, units = "hours")
```

Output: Time difference of 4.258333 hours

```
as.numeric(difftime(time2, time1, units = "hours"))
```

Output: 4.258333

Finding Intervals

```
start_time <- ymd_hms("2023-09-15 08:30:00")
end_time <- ymd_hms("2023-09-15 12:45:30")

interval(start_time, end_time)
```

Output: 2023-09-15 08:30:00 UTC --2023-09-15 12:45:30 UTC

UTC → universal time zone

Formatting Dates

Using `format()`: you can format date-time objects for display

```
my_date <- ymd("2024-10-30")
```

`format(my_date, format = "%A")` # %A - The day of the week (i.e, Friday)

Output: "Wednesday"

`format(my_date, format = "%a")` # %a - The day of the week truncated (i.e, Fri)

Output: "Wed"

```r
my_date <- ymd("2024-10-30")
```

```r
format(my_date, format = "%B")
```
%B - The full name of the month (i.e September)

Output: "October"

```r
format(my_date, format = "%b")
```
%b - The name of the month truncated (i.e., Sep)

Output: "Oct"

```
my_date <- ymd("2024-10-30")
```

```
format(my_date, format = "%D")
```
%D - The date in month/day/year format.

Output: "10/30/24"

```
format(my_date, format = "%d")
```
%d - The number of the day

Output: "30"

```r
my_date <- ymd("2024-10-30")
```

```r
format(my_date, format = "%Y") # %Y - The year with four digits
```

Output: "2024"

```r
format(my_date, format = "%y") # %y - The year with two digits
```

Output: "24"

```
my_date <- ymd("2024-10-30")
```

```
format(my_date, format = "%m") # %m - The number of the month
```

Output: "10"

Suppose you want it to be "Friday, September 15, 2023"

```
format(my_date, format = "%A, %B %d, %Y")
```

Output: "Wednesday, October 30, 2024"