DATE-TIME HANDLING IN R

1. Packages to remember:

lubridate
anytime

Note: lubridate is a part of tidyverse

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2. Classes to remember:

Date Class: Represented as the number of days since 1970-01-01, with negative values for earlier dates.
Useful when you don't want to store time.

POSIXct class : stores date/time values as the number of seconds since January 1, 1970.
Usual choice for storing a datetime.

POSIXlt class : stores them as a list with elements for second, minute, hour, day, month, and year, among others.
Use if you need to store a list only.

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3. Convert non-datetime column in DataFrame to date/datetime

String to date/datetime

Input: "2020.06.30 09:01:45"

a) Output: Date
O/P: "2020-06-30"
```
as.Date(df$col1 ,format='%Y.%m.%d')
```
OR
O/P: "2020-06-30 CDT"
```
as.POSIXlt("2020.06.30", format="%Y.%m.%d")
```
OR
```
as.POSIXct("2020.06.30", format="%Y.%m.%d")
```

Note: format is not needed here when is '-'

Much simpler using anytime:
```
anydate(df$col1)
```
O/P: "2020-06-30"

b) Output: Datetime,
"2020-06-30 09:01:45 CDT"

```
strptime(df$col1, format='%Y.%m.%d  %H:%M:%S')
```
OR
```
as.POSIXlt(df$col1, format='%Y.%m.%d  %H:%M:%S')
```
OR
```
as.POSIXct(df$col1, format='%Y.%m.%d  %H:%M:%S')
```

Much simpler using anytime:
```
anytime(df$col1)
```

Numeric column to date/datetime

Input: 20200630090145

c) Output: Date
"2020-06-30"
```
as.Date(as.character(df$col1) ,format='%Y%m%d')
```

d) Output: Datetime
BaseR:
```
strptime(as.character(df$col1),
format='%Y%m%d%H%M%S')
```
O/P: "2020-06-30 09:01:45 CDT"

Much simpler using lubridate:
```
ymd_hms(df$col1)
```
O/P: "2020-06-30 09:01:45 UTC"

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4. Extract date elements

Easiest using lubridate:
```
day(ymd_hms("20200630090145"))
```
#O/P: 30
```
month(ymd_hms("20200630090145"))
```
 # O/P: 6
```
year(ymd_hms("20200630090145"))
```
 # O/P: 2020
etc.

Or use this:

```
names(unclass(as.POSIXlt("2009-10-04")))
```
 # O/P: "sec" "min" "hour" "mday" "mon" "year"
 # "wday" "yday" "isdst" "zone" "gmtoff

```
d1$min
```
 # O/P: 0

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5. Date arithmetic

a) Date difference in different units using:
```
difftime(End, Start, units='days')
```

where End, Start should be object of classes listed in 2.

b) Date addition in different units:
BaseR:
```
as.Date("2001-01-01") + 11
```
O/P: "2001-01-12"

(or below equivalent)
lubridate:
```
dmy("1/1/2001") + days(11)
```
O/P: "2001-01-12"

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6. Dealing with Time Zone information

See Sys.timezone() to learn how R recognizes time zones.

a) Specify time zone in a datetime object
```
ymd_hms("2020-06-30 00:00:01",
tz = "America/New_York")
```
O/P: "2020-06-30 00:00:01 EDT"

b) Convert datetime into another TZ
   i) Convert time to equivalent time in another TZ
   ```
   with_tz(x, "GMT")
   ```
   # O/P: "2020-06-29 22:30:01 GMT"

   ii) Override current TZ into another TZ
   ```
   force_tz(x, "Europe/Amsterdam")
   ```
   # O/P: "2020-06-30 00:00:01 CEST"