ESP

MONTEREY BAY AQUARIUM RESEARCH INSTITUTE

ESP Times, Dates and Durations

5/23/22 Brent Roman   brent@mbari.org

MBARI

Times and Dates

- Internally represented at seconds since Unix epoch of Sunday, 1/1/1970 UTC

```
Time(“1/1/70UTC”).to_f  #= 0.0
```

- No Time may be later than 1/18/2038
- Local times may be input and output
  - only one local timezone plus UTC
    - can’t input MDT while operating in PDT
- One may input Julian dates
- May input time relative to noon, dawn, dusk

Time Arithmetic

- Subtracting Times = seconds between them
  - `Time(“1/2/22”) - Time(“1/1/22”)` #Time::Days
    - number of seconds in the first day of the year
- Adding Times is not defined
- Adding a number of seconds to time is

  `Time.now - Time::Days` #a day ago
- `Time::Minutes` = 60 = 1.minutes
- `Time::Hours` = 60*60 = 1.hours
- `Time::Days` = 24*60*60 = 1.days
- `Time::Weeks` = 7*24*60*60 = 1.weeks

Durations or Delays

- Convert between seconds and
  - weeks, days, hours, minutes, and seconds
- For more intuitive presentation and input
- How long between April 1st, 2022 and next Christmas?

```
foolsDay=Time “April 1, 2022”
xmas=Time “December 25”
waiting = xmas - foolsDay
23158800.0
```

  - `Delay waiting` #or `waiting.secods`

```
38 weeks, 2 days, 1:00:00
```

  - Extra hour is due to time change

Inputting Durations

`“38 weeks, 2 days, 1:00:00”.seconds`

38 weeks, 2 days, 1:00:00

or, you may abbreviate as:

`“38w2d1::”.seconds`

- `3.weeks = Delay “3 weeks”`
- `3.5.minutes = Delay “3:30”`

- No support for months or years
  - because each are not of equal duration
- Beware daylight savings, leap year, etc.
  - 1 week is always 7 x 24 hour days

Inputting Dates

- *month/day/year* or *day-month-year* or *monthName day, year*
- month may be numeric or an English month name or abbreviation
- year may be 4-digit or 2-digit (xx>=70 is assumed 19xx, else 20xx)
- Input Julian date as: `year%dayOfYear`
  - may include dayOfWeek specification
- Days of the Week must be written as English names or abbreviations
- Beware of overspecified dates, ie. “Sat 2/15/09”

  `ArgumentError ... -- 02/15/09 falls on a Sunday -- not Saturday`
- Last date/time entered is remembered as a reference
- First date entered must specify a year
- When fields are omitted, next date meeting remaining criteria will be chosen
- Examples: Time ...
- “2/17/10” or '10-2-17' or '10%48' or 'February 17, 2010' or ‘2010 Feb 17’
- 'Sat' → the next Saturday i.e. 2/20/10
- “4/5” → April 5th, 2010
- “%300” → October 27, 2010
- “4/5” → April 5th, 2011
  - Beware daylight savings, leap year, etc.
  - 1 week is always 7 x 24 hour days
- All fields are optional

Inputting Times

- *hh*:*mm*:*ss*.*fraction*
  - All the above are optional
  - May be followed by AM or PM
    - If omitted, 24 hour format is assumed (military time)
  - May be proceeded or followed by three letter time zone code
    - UTC and GMT are equivalent
    - The only other option is the local time zone
      - You may not specify EST – unless host's local time is Eastern Standard !!
- Last time entered is remembered as a reference
  - When fields are omitted, next time meeting remaining criteria will be chosen
  - This may be in the next day
  - Time may be proceeded by a plus sign (+) to explicitly add to the last time entered

- Examples: Time ...
  - “`2/17/10 1PM`” or `'10-2-17 1PM'` or `'10%48 1PM'` or `'1PM February 17, 2010'` → *Wed Feb 17 13:00:00 PST 2010*
  - “`9AM`” → *9AM Thursday*
  - “`23:59:59.100`” → *nine tenths of a second before midnight Thursday*
  - “`2::.`” → nine tenths of a second before 2AM Friday
  - “`14:20`” → exactly twenty minutes after 2PM Friday
  - “`12:10 Feb 17, 2010`” → ten minutes after noon on February 17th, 2010
  - “`+5:`” → five minutes later (fifteen after noon)

Inputting Sun Relative Times

- Syntax:

  ({sun}rise|{sun}set|noon){+|-(hours|hh:mm:ss)}
- Requires Time.location be set. Example:

```
Time.location = LatLong 41.426934, -83.047370
```

- Examples of solar times: Time ...

  ‘sunrise’ → next sunrise

  “set-3.5” → *3.5 hours before sunset*

  “noon+22:30” → 22.5 minutes after solar noon

  “6/14 set+3:15.5” →

  next Jun 14, 3 min, 15.5 seconds after sunset