Homework 3: lubridate and purrr

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```r
# libraries
library(tidyverse)
library(lubridate)
library(purrr)
```

Exercise 1: Advanced Date Manipulation with lubridate   Generate a sequence of dates from **January 1, 2015** to **December 31, 2025**, spaced by every **two months**. Extract the **year**, **quarter**, and **ISO week number** for each date.

```r
# Generate a sequence of dates spaced by 2 months
date_seq <- seq(ymd("2015-01-01"), ymd("2025-12-31"), by = "2 months")

# extract year
date_seq %>% year()
```

```
##  [1] 2015 2015 2015 2015 2015 2015 2016 2016 2016 2016 2016 2016 2017 2017 2017
## [16] 2017 2017 2017 2018 2018 2018 2018 2018 2018 2019 2019 2019 2019 2019 2019
## [31] 2020 2020 2020 2020 2020 2020 2021 2021 2021 2021 2021 2021 2022 2022 2022
## [46] 2022 2022 2022 2023 2023 2023 2023 2023 2023 2024 2024 2024 2024 2024 2024
## [61] 2025 2025 2025 2025 2025 2025
```

```r
# extract quarter
date_seq %>% quarter()
```

```
##  [1] 1 1 2 3 3 4 1 1 2 3 3 4 1 1 2 3 3 4 1 1 2 3 3 4 1 1 2 3 3 4 1 1 2 3 3 4 1 1
## [39] 2 3 3 4 1 1 2 3 3 4 1 1 2 3 3 4 1 1 2 3 3 4 1 1 2 3 3 4
```

```r
# extract ISO week number
date_seq %>% isoweek()
```

```
##  [1]  1  9 18 27 36 44 53  9 17 26 35 44 52  9 18 26 35 44  1  9 18 26 35 44  1
## [26]  9 18 27 35 44  1  9 18 27 36 44 53  9 17 26 35 44 52  9 17 26 35 44 52  9
## [51] 18 26 35 44  1  9 18 27 35 44  1  9 18 27 36 44
```

Exercise 2: Complex Date Arithmetic   Given the following dates, compute the difference in **months** and **weeks** between each consecutive pair.

```r
sample_dates <- c("2018-03-15", "2020-07-20", "2023-01-10", "2025-09-05")
sample_dates <- ymd(sample_dates)

# difference in months
diff1_month <- interval(sample_dates[1], sample_dates[2]) %/% months(1)
diff2_month <- interval(sample_dates[3], sample_dates[4]) %/% months(1)

# difference in weeks
diff1_week <- interval(sample_dates[1], sample_dates[2]) %/% weeks(1)
diff2_week <- interval(sample_dates[3], sample_dates[4]) %/% weeks(1)

# print
print(paste("The difference between", sample_dates[1],
            "and", sample_dates[2], "is", diff1_month, "months."))
```

```
## [1] "The difference between 2018-03-15 and 2020-07-20 is 28 months."
```

```r
print(paste("The difference between", sample_dates[1],
            "and", sample_dates[2], "is", diff1_week, "weeks."))
```

```
## [1] "The difference between 2018-03-15 and 2020-07-20 is 122 weeks."
```

```r
print(paste("The difference between", sample_dates[3],
            "and", sample_dates[4], "is", diff2_month, "months."))
```

```
## [1] "The difference between 2023-01-10 and 2025-09-05 is 31 months."
```

```r
print(paste("The difference between", sample_dates[3],
            "and", sample_dates[4], "is", diff2_week, "weeks."))
```

```
## [1] "The difference between 2023-01-10 and 2025-09-05 is 138 weeks."
```

Exercise 3: Higher-Order Functions with purrr   Using `map()` and `map_dbl()`, compute the **mean**, **median**, and **standard deviation** for each numeric vector in the following list:

```r
num_lists <- list(c(4, 16, 25, 36, 49),
                  c(2.3, 5.7, 8.1, 11.4), c(10, 20, 30, 40, 50))

# mean
num_lists %>% map(mean)
```

```
## [[1]]
## [1] 26
##
## [[2]]
## [1] 6.875
##
## [[3]]
## [1] 30
```

```r
# median
num_lists %>% map(median)
```

```
## [[1]]
## [1] 25
##
## [[2]]
## [1] 6.9
##
## [[3]]
## [1] 30
```

```r
# standard deviation
num_lists %>% map(sd)
```

```
## [[1]]
## [1] 17.42125
##
## [[2]]
## [1] 3.8422
##
## [[3]]
## [1] 15.81139
```

Exercise 4: Combining lubridate and purrr Given a list of mixed date formats, use `map()` and `possibly()` from **purrr** to safely convert the to **Date** format and extract the **month name**.

```r
date_strings <- list("2023-06-10", "2022/12/25", "15-Aug-2021", "InvalidDate")

# convert dates to correct format
date_strings[[3]] <- as.Date(date_strings[[3]], format = "%d-%b-%Y")
date_strings[1:2] <- map(date_strings[1:2], ymd)

# extract month name
date_strings %>% map(possibly(months, otherwise = NA))
```

```
## [[1]]
## [1] "June"
##
## [[2]]
## [1] "December"
##
## [[3]]
## [1] "August"
##
## [[4]]
## [1] NA
```