PBPB: Features

For the following **four** metrics, apply the formulas below to add these as new columns in your dataframe. When done, display in a table that contains only the dates column and these four new columns.

1. Add a column with the **daily return**, calculated with the following formula:

$$return_{daily} = \frac{(close_t - close_{t-1})}{close_{t-1}}$$

2. Add a column with the **overnight return**, calculated with the following formula:

$$return_{overnight} = \frac{(open_t - close_{t-1})}{close_{t-1}}$$

3. Add a column with the **close-open change**, calculated with this formula:

$$change_{close\text{-}open} = close_t - open_t$$

4. Add a column with the **money flow volume indicator (MFV)**, calculated with this formula:

$$MFV = \frac{((close_t - low_t) - (high_t - close_t))}{(high_t - low_t)} * volume_t$$

More features, metrics and dates

Add the following **two** columns to your dataframe:

5. Add a column that indicates the **month**.

6. Add a column that indicates the **year**.

> **HINT:** The `lubridate` package in R is used to extract day, month and year information from `Date` type data. For example, we can extract the day information from a `Date` using `day()`. The `month()` and `year()` functions are used to extract month and year, respectively.
>
> Load the `lubridate` package and add the above two columns

After having completed the above, calculate and display the following metrics:

7. The total trading volume, in June 2023.

8. The mean daily return, over the entire period.

Finally, find and display the following key dates:

9. The date that saw the largest positive **high** price.

10. The date that saw the largest positive daily return.

> Were there any corporate announcements on these dates which might explain these high numbers?