NW coding assignment

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```
library(readr)
library(ggplot2)
library(knitr)
trades <- read_csv("Downloads/trades.csv",
                   show_col_types = FALSE,
                   col_types = cols(trans_date = col_date(format = "%m/%d/%Y")))
```

```
## Warning: One or more parsing issues, call 'problems()' on your data frame for details,
## e.g.:
##   dat <- vroom(...)
##   problems(dat)
```

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(tidyr)
trades1 = trades %>%
  filter(trans_date >= "2023-01-01" & trans_date <= "2023-04-30") %>%
  distinct()
```

```
trades2 = trades1 %>%
  mutate(sums = case_when(trans_type == "A" ~ shares,
                          trans_type == "D" ~ -1 * shares))
```

```
table1 = trades2 %>%
  group_by(ticker) %>%
  summarise(net_shares = sum(sums),
            total_trades = n(),
            percent_traded = (mean(shares/(shares + shares_owned)))*100,
            net_profits = sum(sums*-1 * price, na.rm = T))
```

```
kable(sample_n(table1,10))
```

ticker	net_shares	total_trades	percent_traded	net_profits
JELD	436259	31	10.305284	-1788328.33
MKFG	-205834	10	1.727109	218863.96
STR	193274	9	16.833435	-271675.00
PLTK	-79456969	26	14.391096	636806905.86
SCVL	98781	19	15.763336	1696052.50
AXON	1248740	114	2.763441	-223995086.09
XXII	1727909	14	24.113902	275666.60
AMK	-11789	6	28.914901	303587.74
MPLN	12026242	20	25.110339	268611.30
VCLN	2752	2	3.402938	1968.93

I included in the table the number of trades realized during this period as wellas the amount of shares transacted as a percentage of the number of shares held before the transaction defined as:

$$mean(\frac{shares}{shares + shares\_owned})$$

I think this would be a useful indicator of trade volumes with respect to stock holdings.

I have also included a measure for the profits taken during this period defined as:

$$\sum shares\_disposed * sell\_price - \sum shares\_aquired * buy\_price$$

Where a positive number indicates more profits, as the ticker is being sold more or at a higher price. Therefore, this table now includes information on the net number of shares transacted, a measure of the frequency of transactions during this period, a measure of the volume of shares transacted with respect to previous share holdings and a measure for the amount of profit taken during this period.

```
stocks <- read_csv("Downloads/stocks_Jan-Nov2023.csv",show_col_types = FALSE,
                col_types = cols(date = col_date(format = "%m/%d/%Y")))
stocks1 = stocks %>%
  distinct()
```

```
returns_graph = function (dates, ticker1, starting){
  data = stocks %>%
    filter(TICKER == ticker1 & date >= dates[1] & date <= as.Date(dates[2])+1)
  value = c(starting)
  for (i in data$RET[2:nrow(data)]){
  value = append(value, value[length(value)]*(1+i))
  }
  ggplot(data[1:nrow(data)-1,],aes(x = data$date[1:nrow(data)-1])) +
    geom_line(aes(y = value[1:length(value)-1], color = "Investment Value"))+
  geom_hline(yintercept = starting,
            aes(color = "Initial Value"),linetype="dotted")+
  theme_classic()+theme(legend.position = "top")+
  theme(panel.grid.major.y = element_line(),
        panel.grid.minor.y = element_line())+
  labs(title = paste("Value of", toString(starting), "invested in",
```

```
                  ticker1,"from",dates[1],"to",dates[2], sep = " "),
    x = "Date", y = "Value of Investment in USD", color = "",
    subtitle = paste(
      paste("Final Value in USD:",
            toString(round(value[length(value)-1],2))),
      paste("Cumulative Return: ",
            toString(round((value[length(value)-1]-starting)/starting, 4))),
      sep = "\n"))+
  theme(axis.title = element_text(size=11,family = "serif"),
        plot.title = element_text(size=15,family = "serif", face = "bold"),
        legend.text = element_text(size=10,family = "serif"),
        plot.subtitle = element_text(size=11,family = "serif"),
        plot.caption = element_text(size = 8,family = "serif", hjust= 0))+
  scale_color_manual(values=c('steelblue', 'black'))
}
```
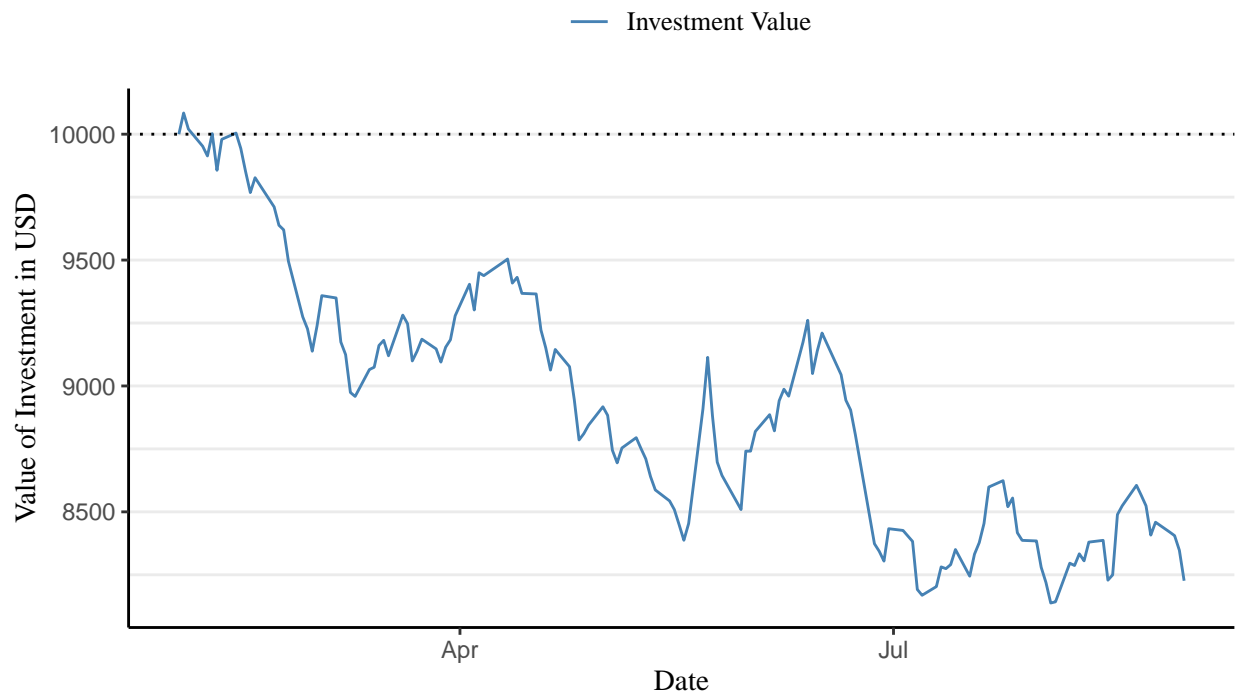
```
returns_graph(c("2023-02-01","2023-08-31"),"PFE",10000)
```

Value of 10000 invested in PFE from 2023−02−01 to 2023−08−31

Final Value in USD: 8226.3
Cumulative Return: −0.1774


```
table2 = stocks1 %>%
  filter(date >= as.Date("2023-05-01")+1 & date < "2023-11-30") %>%
  group_by(TICKER) %>%
  summarise(cumulative_return_RET = prod(1 + RET, na.rm = T)-1)
```

```
kable(sample_n(table2,10))
```

TICKER	cumulative_return_RET
ENFN	0.1658895
AZTR	-0.7874494
XRX	-0.0578760
KOSS	-0.2775123
PKI	-0.1153090
TFSL	0.2008890
AMPL	-0.0576927
ML	2.3704138
PLAB	0.4479469
ICHR	-0.0517466

I calculated returns based on the RET values on the original data and then spot-checked my results using online calculators like https://www.dividendchannel.com/drip-returns-calculator/

```
footnotes <- read_csv("Downloads/footnotes.csv", show_col_types = FALSE)
footnotes1 = footnotes %>%
  distinct()
```

```
dates1 = trades1%>%
  filter(trans_date >= "2023-01-01" & trans_date <= "2023-04-30") %>%
  distinct(accession_num, .keep_all = T) %>%
  select(accession_num, trans_date)
```

```
footnotes2 = right_join(dates1,footnotes1, by = "accession_num")
```

```
footnotes3 = footnotes2 %>%
  mutate("10b5-1" = case_when(grepl("10(b)5-1", text, fixed = T)~1,
                              grepl("10(b)5-1", text, fixed = F) ~ 0))
```

```
footnotes3 %>%
  filter(trans_date >= "2023-01-01" & trans_date <= "2023-04-30") %>%
  summarise('10(b)5-1' = sum(`10b5-1`, na.rm = T)) %>%
  kable()
```

10(b)5-1
2

```
has_10b51_ = footnotes3 %>%
  filter(trans_date >= "2023-01-01" & trans_date <= "2023-04-30") %>%
  filter(`10b5-1` == 1)
```

```
kable(has_10b51_[,c("trans_date", "accession_num", "text")])
```

trans_date	accession_num	text
2023-02-16	0000899243-23-005490	Sale of common stock was effected pursuant to a 10(b)5-1 trading plan adopted on September 06, 2022.
2023-02-16	0000899243-23-005490	Sale of common stock was effected pursuant to a 10(b)5-1 trading plan adopted on September 06, 2022.

```r
has_10b51_all = footnotes3 %>%
  filter(`10b5-1` == 1)
kable(sample_n(has_10b51_all[,c("trans_date", "accession_num", "text")],10))
```

trans_date	accession_num	text
NA	0000315189-23-000020	Exercise of Rule 16b-3 options and related sales of shares pursuant to Rule 10(b)5-1(c) stock option exercise plan adopted on February 22, 2023.
NA	0000315189-23-000019	Exercise of Rule 16(b)-3 options and related sales of shares pursuant to Rule 10(b)5-1 stock option exercise plan adopted on February 23, 2023.
NA	0000315189-23-000020	Exercise of Rule 16b-3 options and related sales of shares pursuant to Rule 10(b)5-1(c) stock option exercise plan adopted on February 22, 2023.
NA	0000315189-23-000019	Exercise of Rule 16(b)-3 options and related sales of shares pursuant to Rule 10(b)5-1 stock option exercise plan adopted on February 23, 2023.
NA	0000315189-23-000020	Exercise of Rule 16b-3 options and related sales of shares pursuant to Rule 10(b)5-1(c) stock option exercise plan adopted on February 22, 2023.
NA	0000315189-23-000022	Exercise of Rule 16b-3 options and related sales of shares pursuant to Rule 10(b)5-1(c) stock option exercise plan adopted December 5, 2022.
NA	0000315189-23-000019	Exercise of Rule 16(b)-3 options and related sales of shares pursuant to Rule 10(b)5-1 stock option exercise plan adopted on February 23, 2023.
NA	0001209191-23-038019	This transaction was made pursuant to a Rule 10(b)5-1 trading plan adopted by Mr. Jones on May 27, 2022 (the "Plan").
NA	0000315189-23-000019	Exercise of Rule 16(b)-3 options and related sales of shares pursuant to Rule 10(b)5-1 stock option exercise plan adopted on February 23, 2023.
NA	0000315189-23-000019	Exercise of Rule 16(b)-3 options and related sales of shares pursuant to Rule 10(b)5-1 stock option exercise plan adopted on February 23, 2023.

I looked into the original csv as a text file and also found 64 occurrences of 10(b)5-1, which tells me that the search function for "10(b)5-1" is working properly. And the date filtering was done in a similar style as before, so its reliability has been shown in previous exercises.