

Forward

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```
library(stringr)
library(tidyverse)

## -- Attaching packages ----- tidyverse 1.3.2 --
## v ggplot2 3.4.0      v purrr  1.0.0
## v tibble  3.1.8      v dplyr  1.0.10
## v tidyr   1.2.1      v forcats 0.5.2
## v readr   2.1.3
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()

SP_data<-read.csv(file = "Spot_data_ad.csv", header = T)

s<-c('1','2')
s<-append(s,10)
print(s)

## [1] "1" "2" "10"

F_11 <- c()
for (i in 1:5){
  t_1=((44-i+1)/365)+1
  f_11 = (SP_data$X2025M1[i]*(t_1+1) - SP_data$X2024M1[i]*t_1 )/1
  F_11 <- append(F_11, f_11)
}

for (i in 6:10){
  t_1=((44-i+1-2)/365)+1
  f_11 = (SP_data$X2025M1[i]*(t_1+1) - SP_data$X2024M1[i]*t_1 )/1
  F_11 <- append(F_11, f_11)
}

print(F_11)

## [1] 0.02795826 0.02693018 0.02576743 0.02569003 0.02679358 0.02741242
## [7] 0.02797010 0.02713075 0.02683789 0.02815799

F_11.5 <- c()
for (i in 1:5){
  t_1=((44-i+1)/365)+1
  f_11.5 = (SP_data$X2025S1[i]*(t_1+1.5) - SP_data$X2024M1[i]*t_1 )/1.5
  F_11.5 <- append(F_11.5, f_11.5)
}
```

```

for (i in 6:10){
  t_1=((44-i+1-2)/365)+1
  f_11.5 = (SP_data$X2025S1[i]*(t_1+1.5) - SP_data$X2024M1[i]*t_1 )/1.5
  F_11.5 <- append(F_11.5, f_11.5)
}

print(F_11.5)

```

```

## [1] 0.02849679 0.02796851 0.02652620 0.02634852 0.02719151 0.02757984
## [7] 0.02775148 0.02696984 0.02678504 0.02828826

```

```

F_12 <- c()
for (i in 1:5){
  t_1=((44-i+1)/365)+1
  f_12 = (SP_data$X2026M1[i]*(t_1+2) - SP_data$X2024M1[i]*t_1 )/2
  F_12 <- append(F_12, f_12)
}

for (i in 6:10){
  t_1=((44-i+1-2)/365)+1
  f_12 = (SP_data$X2026M1[i]*(t_1+2) - SP_data$X2024M1[i]*t_1 )/2
  F_12 <- append(F_12, f_12)
}

print(F_12)

```

```

## [1] 0.02766016 0.02676932 0.02589066 0.02532143 0.02613442 0.02666045
## [7] 0.02684863 0.02603300 0.02584068 0.02699237

```

```

F_12.5 <- c()
for (i in 1:5){
  t_1=((44-i+1)/365)+1
  f_12.5 = (SP_data$X2026S1[i]*(t_1+2.5) - SP_data$X2024M1[i]*t_1 )/2.5
  F_12.5 <- append(F_12.5, f_12.5)
}

for (i in 6:10){
  t_1=((44-i+1-2)/365)+1
  f_12.5 = (SP_data$X2026S1[i]*(t_1+2.5) - SP_data$X2024M1[i]*t_1 )/2.5
  F_12.5 <- append(F_12.5, f_12.5)
}

print(F_12.5)

```

```

## [1] 0.02659993 0.02583236 0.02442088 0.02408743 0.02538781 0.02560385
## [7] 0.02561209 0.02522335 0.02528347 0.02614272

```

```

F_13 <- c()
for (i in 1:5){
  t_1=((44-i+1)/365)+1
  f_13 = (SP_data$X2027M1[i]*(t_1+3) - SP_data$X2024M1[i]*t_1 )/3
  F_13 <- append(F_13, f_13)
}

for (i in 6:10){

```

```

    t_1=((44-i+1-2)/365)+1
    f_13 = (SP_data$X2027M1[i]*(t_1+3) - SP_data$X2024M1[i]*t_1 )/3
    F_13 <- append(F_13, f_13)
}

print(F_13)

## [1] 0.02583005 0.02522420 0.02374659 0.02346558 0.02473387 0.02494358
## [7] 0.02491024 0.02454794 0.02470824 0.02560773

F_13.5 <- c()
for (i in 1:5){
    t_1=((44-i+1)/365)+1
    f_13.5 = (SP_data$X2027S1[i]*(t_1+3.5) - SP_data$X2024M1[i]*t_1 )/3.5
    F_13.5 <- append(F_13.5, f_13.5)
}

for (i in 6:10){
    t_1=((44-i+1-2)/365)+1
    f_13.5 = (SP_data$X2027S1[i]*(t_1+3.5) - SP_data$X2024M1[i]*t_1 )/3.5
    F_13.5 <- append(F_13.5, f_13.5)
}

print(F_13.5)

## [1] 0.02529342 0.02473781 0.02347460 0.02338335 0.02467940 0.02494311
## [7] 0.02493402 0.02466643 0.02482496 0.02573786

F_14 <- c()
for (i in 1:5){
    t_1=((44-i+1)/365)+1
    f_14 = (SP_data$X2028M1[i]*(t_1+4) - SP_data$X2024M1[i]*t_1 )/4
    F_14 <- append(F_14, f_14)
}

for (i in 6:10){
    t_1=((44-i+1-2)/365)+1
    f_14 = (SP_data$X2028M1[i]*(t_1+4) - SP_data$X2024M1[i]*t_1 )/4
    F_14 <- append(F_14, f_14)
}

print(F_14)

## [1] 0.02521869 0.02476174 0.02348371 0.02345572 0.02484235 0.02499477
## [7] 0.02489626 0.02464156 0.02491639 0.02579853

```