Problem set 5

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## Problem 1

1… 10

## 11

**11.a** A movie should appear in the dataset at least 18 times. Each has a record for the weekend (Friday, Saturday and Sunday) from the opening weekend to at least 6 weekends later (for the ones kept). The ones dropped were not in theaters for more than 6 weekends.

**11.b**

#keeping films that aren't dropped  
films\_used <- films |>   
 filter(dropped != 1)

**11.c**

# day when 12 Rounds came in  
round\_12\_date <- as.Date("2009-03-27")  
  
# Define the number of days to add  
days\_before <- 17984 #number under 12 Rounds "date" column  
  
# Days prior to the   
reference\_date <- round\_12\_date - days\_before  
  
# Print the new date  
print(reference\_date)

## [1] "1959-12-31"

**11.d**

films\_used\_d <- films\_used |>   
 mutate(movie\_date = as.Date(reference\_date + date)) |>   
 #putting the release\_date in the 4th column  
 select(title, production\_budget, release\_yr,  
 movie\_date, sat\_date, everything())  
  
films\_used\_d[, c("title", "movie\_date")]

## # A tibble: 24,855 × 2  
## title movie\_date  
## <chr> <date>   
## 1 (500) Days of Summer 2009-08-07  
## 2 12 Rounds 2009-03-27  
## 3 127 Hours 2010-11-25  
## 4 13 Going on 30 2004-04-24  
## 5 1408 2007-06-23  
## 6 16 Blocks 2006-03-04  
## 7 17 Again 2009-04-18  
## 8 2 Fast 2 Furious 2003-06-06  
## 9 2012 2009-11-14  
## 10 21 2008-03-27  
## # ℹ 24,845 more rows

**11.e**

#first using sat\_date to get the date for each saturday  
films\_used\_date <- films\_used\_d |>  
 #getting the day for saturday  
 mutate(sat\_day = reference\_date + sat\_date) |>  
 #sanity check... check for days that aren't Sat...It's all friday actually  
 mutate(sat\_day\_of\_week = wday(sat\_day, label = TRUE)) |>  
 mutate(  
 fri\_dummy = ifelse(movie\_date == sat\_day, 1, 0),  
 sat\_dummy = ifelse(movie\_date == sat\_day + 1, 1, 0),  
 #reasoning... there was no movie released on Sunday....  
 thu\_dummy = ifelse(movie\_date == sat\_day - 1, 1, 0)   
 ) |>  
 #renaming it friday since its dates are fridays  
 rename(fri\_day = sat\_day) |>   
 mutate(sat\_day = fri\_day + 1) #making a saturday variable  
  
films\_used\_date[, c("title", "movie\_date","fri\_day"  
 ,"fri\_dummy", "sat\_dummy", "thu\_dummy")]

## # A tibble: 24,855 × 6  
## title movie\_date fri\_day fri\_dummy sat\_dummy thu\_dummy  
## <chr> <date> <date> <dbl> <dbl> <dbl>  
## 1 (500) Days of Summer 2009-08-07 2009-08-07 1 0 0  
## 2 12 Rounds 2009-03-27 2009-03-27 1 0 0  
## 3 127 Hours 2010-11-25 2010-11-26 0 0 1  
## 4 13 Going on 30 2004-04-24 2004-04-23 0 1 0  
## 5 1408 2007-06-23 2007-06-22 0 1 0  
## 6 16 Blocks 2006-03-04 2006-03-03 0 1 0  
## 7 17 Again 2009-04-18 2009-04-17 0 1 0  
## 8 2 Fast 2 Furious 2003-06-06 2003-06-06 1 0 0  
## 9 2012 2009-11-14 2009-11-13 0 1 0  
## 10 21 2008-03-27 2008-03-28 0 0 1  
## # ℹ 24,845 more rows

**11.f**

#creating dummies for week using fastDummies  
films\_used\_date <- films\_used\_date |>   
 arrange(title, fri\_day) |>   
 group\_by(title) |>   
 # Assign numeric labels to unique elements of sat\_date within each title  
 mutate(week = as.integer(factor(sat\_date)))  
  
  
#Now using fast dummies...  
films\_used\_date <- dummy\_cols(films\_used\_date, select\_columns = 'week')  
films\_used\_date[, c("title", "movie\_date" ,"week\_1", "week\_2", "week\_3")]

## # A tibble: 24,855 × 5  
## title movie\_date week\_1 week\_2 week\_3  
## <chr> <date> <int> <int> <int>  
## 1 (500) Days of Summer 2009-08-07 1 0 0  
## 2 (500) Days of Summer 2009-08-06 1 0 0  
## 3 (500) Days of Summer 2009-08-08 1 0 0  
## 4 (500) Days of Summer 2009-08-13 0 1 0  
## 5 (500) Days of Summer 2009-08-14 0 1 0  
## 6 (500) Days of Summer 2009-08-15 0 1 0  
## 7 (500) Days of Summer 2009-08-20 0 0 1  
## 8 (500) Days of Summer 2009-08-22 0 0 1  
## 9 (500) Days of Summer 2009-08-21 0 0 1  
## 10 (500) Days of Summer 2009-08-29 0 0 0  
## # ℹ 24,845 more rows

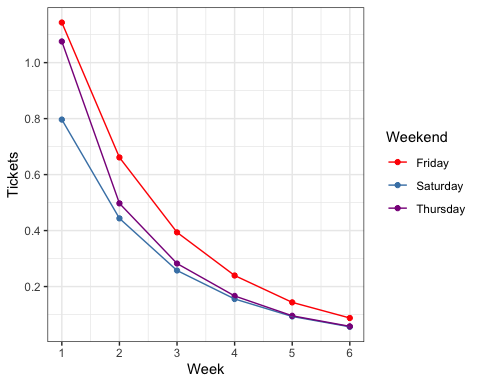
**11.g**

#using the "Fast Dummies" library... to automatically create dummies for year  
film <- dummy\_cols(films\_used\_date, select\_columns = 'release\_yr')  
  
film[, c("title", "release\_yr", "release\_yr\_2009", "release\_yr\_2010")]

## # A tibble: 24,855 × 4  
## title release\_yr release\_yr\_2009 release\_yr\_2010  
## <chr> <dbl> <int> <int>  
## 1 (500) Days of Summer 2009 1 0  
## 2 (500) Days of Summer 2009 1 0  
## 3 (500) Days of Summer 2009 1 0  
## 4 (500) Days of Summer 2009 1 0  
## 5 (500) Days of Summer 2009 1 0  
## 6 (500) Days of Summer 2009 1 0  
## 7 (500) Days of Summer 2009 1 0  
## 8 (500) Days of Summer 2009 1 0  
## 9 (500) Days of Summer 2009 1 0  
## 10 (500) Days of Summer 2009 1 0  
## # ℹ 24,845 more rows

**11.h**

#combine the weekends   
temp <- film |>   
 mutate(weekend = case\_when(  
 sat\_dummy == 1 ~ "Saturday",  
 fri\_dummy == 1 ~ "Friday",  
 thu\_dummy == 1 ~ "Thursday"  
 )) |>   
 group\_by(week, weekend) |>   
 summarize(mean = mean(tickets, na.rm = TRUE))  
  
temp |>   
 ggplot(aes(x = week, y = mean, color = as.factor(weekend))) +  
 geom\_point() +  
 geom\_line() +  
 scale\_color\_manual(values = c("Saturday" = "#4682B4",   
 "Friday" = "red",   
 "Thursday" = "#8B008B")) +  
 labs(color = "Weekend",  
 y = "Tickets",  
 x = "Week") +  
 scale\_x\_continuous(breaks = scales::pretty\_breaks(n = 6)) + # Set x-axis ticks  
 scale\_y\_continuous(breaks = scales::pretty\_breaks(n = 6)) + # Set y-axis ticks  
 theme\_bw()



## 12

NOT NEEDED

## 13

#subset colnames that have the hh in them  
holiday <- str\_subset(colnames(film), "hh")  
  
#make the things in holiday "add"  
holiday\_dummy <- str\_c(holiday, collapse = " + ")  
  
#day of the week dummies  
weekend\_dummy <- str\_c(str\_subset(colnames(film), "dummy"), collapse = " + ")  
  
#week of the year dummies  
week\_dummy <- str\_c(str\_subset(colnames(film), "week\_"), collapse = " + ")  
  
#year of the week dummy  
year\_dummy <- str\_c(str\_subset(colnames(film), "release\_yr\_"), collapse = " + ")  
  
#combine  
mod1 <- glue("tickets ~ {weekend\_dummy} + {week\_dummy} + {year\_dummy} + {holiday\_dummy}")  
  
#fit a regression model  
reg\_mod1 <- lm(as.formula(mod1), data = film)  
  
  
film <- film |>   
 mutate(pred\_tickets = predict(reg\_mod1, film)) |>   
 mutate(abnormal\_viewership = tickets - pred\_tickets)  
  
film[, c("tickets","pred\_tickets", "abnormal\_viewership", "fri\_day")]

## # A tibble: 24,855 × 4  
## tickets pred\_tickets abnormal\_viewership fri\_day   
## <dbl> <dbl> <dbl> <date>   
## 1 0.185 1.07 -0.890 2009-08-07  
## 2 0.159 0.991 -0.833 2009-08-07  
## 3 0.155 0.933 -0.777 2009-08-07  
## 4 0.126 0.518 -0.393 2009-08-14  
## 5 0.153 0.602 -0.449 2009-08-14  
## 6 0.117 0.460 -0.343 2009-08-14  
## 7 0.0981 0.296 -0.198 2009-08-21  
## 8 0.0808 0.237 -0.156 2009-08-21  
## 9 0.125 0.379 -0.254 2009-08-21  
## 10 0.0660 0.114 -0.0478 2009-08-28  
## # ℹ 24,845 more rows

## 14

weather <- read\_dta("data/weather\_collapsed\_all.dta")  
  
#adding www to the column names  
original\_cols <- colnames(weather)   
  
# adding prefix using the paste   
colnames(weather) <- paste("www", original\_cols, sep = "\_")   
  
weather

## # A tibble: 1,644 × 112  
## www\_sat\_date www\_snow\_0 www\_rain\_0 www\_mat5\_10\_0 www\_mat5\_15\_0 www\_mat5\_20\_0  
## <date> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 1982-01-02 0.165 0.533 0.0391 0.0276 0.0318   
## 2 1982-01-09 0.422 0.0916 0.464 0.0742 0.0529   
## 3 1982-01-16 0.255 0.0538 0.386 0.0455 0.0352   
## 4 1982-01-23 0.216 0.0675 0.158 0.0589 0.0388   
## 5 1982-01-30 0.288 0.470 0.0616 0.0299 0.0372   
## 6 1982-02-06 0.0699 0.0269 0.0227 0.0434 0.121   
## 7 1982-02-13 0.0907 0.159 0.000875 0.00193 0.00840  
## 8 1982-02-20 0.232 0.216 0.00264 0 0   
## 9 1982-02-27 0.0608 0.0838 0.00423 0.00282 0.00687  
## 10 1982-03-06 0.293 0.392 0.0174 0.0219 0.0680   
## # ℹ 1,634 more rows  
## # ℹ 106 more variables: www\_mat5\_25\_0 <dbl>, www\_mat5\_30\_0 <dbl>,  
## # www\_mat5\_35\_0 <dbl>, www\_mat5\_40\_0 <dbl>, www\_mat5\_45\_0 <dbl>,  
## # www\_mat5\_50\_0 <dbl>, www\_mat5\_55\_0 <dbl>, www\_mat5\_60\_0 <dbl>,  
## # www\_mat5\_65\_0 <dbl>, www\_mat5\_70\_0 <dbl>, www\_mat5\_75\_0 <dbl>,  
## # www\_mat5\_80\_0 <dbl>, www\_mat5\_85\_0 <dbl>, www\_mat5\_90\_0 <dbl>,  
## # www\_mat5\_95\_0 <dbl>, www\_prec\_0\_0 <dbl>, www\_prec\_1\_0 <dbl>, …

weather\_film <- film |>   
 left\_join(weather,  
 #combine on dates, automatically filters out dates that don't match  
 by = c("movie\_date" = "www\_sat\_date"))  
  
weather\_film |>   
 select(contains('movie\_date'), contains("www"))

## # A tibble: 24,855 × 112  
## movie\_date www\_snow\_0 www\_rain\_0 www\_mat5\_10\_0 www\_mat5\_15\_0 www\_mat5\_20\_0  
## <date> <dbl> <dbl> <dbl> <dbl> <dbl>  
## 1 2009-08-07 NA NA NA NA NA  
## 2 2009-08-06 NA NA NA NA NA  
## 3 2009-08-08 0 0.287 0 0 0  
## 4 2009-08-13 NA NA NA NA NA  
## 5 2009-08-14 NA NA NA NA NA  
## 6 2009-08-15 0 0.287 0 0 0  
## 7 2009-08-20 NA NA NA NA NA  
## 8 2009-08-22 0 0.290 0 0 0  
## 9 2009-08-21 NA NA NA NA NA  
## 10 2009-08-29 0 0.276 0 0 0  
## # ℹ 24,845 more rows  
## # ℹ 106 more variables: www\_mat5\_25\_0 <dbl>, www\_mat5\_30\_0 <dbl>,  
## # www\_mat5\_35\_0 <dbl>, www\_mat5\_40\_0 <dbl>, www\_mat5\_45\_0 <dbl>,  
## # www\_mat5\_50\_0 <dbl>, www\_mat5\_55\_0 <dbl>, www\_mat5\_60\_0 <dbl>,  
## # www\_mat5\_65\_0 <dbl>, www\_mat5\_70\_0 <dbl>, www\_mat5\_75\_0 <dbl>,  
## # www\_mat5\_80\_0 <dbl>, www\_mat5\_85\_0 <dbl>, www\_mat5\_90\_0 <dbl>,  
## # www\_mat5\_95\_0 <dbl>, www\_prec\_0\_0 <dbl>, www\_prec\_1\_0 <dbl>, …

## 15

# Select columns with names containing "www\_"  
www\_columns <- str\_subset(colnames(weather\_film), "www\_")  
  
# Create a copy of the original dataframe  
df <- weather\_film   
  
# Define regression formula with dummy variables  
regressors <- glue("~ {weekend\_dummy} + {week\_dummy} + {year\_dummy} + {holiday\_dummy}")  
  
# Iterate over columns with names containing "www\_"  
for (columns in www\_columns) {  
 # Construct regression formula  
 model <- paste(columns, regressors)  
   
 # Generate names for predicted values and residuals  
 pred\_name <- paste("pred", columns, sep = "\_")  
 resid\_name <- paste("resid", columns, sep = "\_")  
   
 # Add predicted values and residuals to the dataframe  
 df <- df |>   
 mutate(!!pred\_name := predict(lm(as.formula(model), data = df), df)) |>   
 #residuals = column - predicted\_value\_for\_column  
 mutate(!!resid\_name := eval(parse(text = columns)) - eval(parse(text = pred\_name)))  
}  
  
#remove the predicted and original values, keeping only the residuals  
new\_weather <- df |>   
 select(-c(contains("pred\_www"), starts\_with("www")))

## 16

#combine  
#fit a regression model  
week\_2\_data <- new\_weather |>   
 filter(week\_2 == 1)  
  
#using the same regression   
reg\_mod2 <- lm(as.formula(mod1), data = week\_2\_data)  
  
  
new\_weather\_film <- new\_weather |>   
 mutate(pred\_tickets\_wk\_2 = predict(reg\_mod2, new\_weather)) |>   
 mutate(abnormal\_viewership\_wk\_2 = tickets - pred\_tickets\_wk\_2)  
  
  
new\_weather\_film[, c("tickets", "pred\_tickets\_wk\_2", "week\_2", "abnormal\_viewership\_wk\_2")]

## # A tibble: 24,855 × 4  
## tickets pred\_tickets\_wk\_2 week\_2 abnormal\_viewership\_wk\_2  
## <dbl> <dbl> <int> <dbl>  
## 1 0.185 0.615 0 -0.431  
## 2 0.159 0.455 0 -0.297  
## 3 0.155 0.394 0 -0.238  
## 4 0.126 0.455 1 -0.330  
## 5 0.153 0.615 1 -0.462  
## 6 0.117 0.394 1 -0.277  
## 7 0.0981 0.455 0 -0.357  
## 8 0.0808 0.394 0 -0.313  
## 9 0.125 0.615 0 -0.490  
## 10 0.0660 0.394 0 -0.328  
## # ℹ 24,845 more rows

## 17

#Mak  
#subsetting the data to just be week 1  
week\_1\_data <- new\_weather\_film |>   
 filter(week\_1 == 1)  
  
#creating the "abnormal viewerships in week 1"------------  
mod1 <- glue("tickets ~ {weekend\_dummy} + {week\_dummy} + {year\_dummy} + {holiday\_dummy}")  
  
#fit a regression model  
reg\_mod1 <- lm(as.formula(mod1), data = week\_1\_data)  
  
www\_film\_ab <- new\_weather\_film |>   
 mutate(pred\_tickets\_wk\_1 = predict(reg\_mod1, new\_weather\_film)) |>   
 mutate(abnormal\_viewership\_wk1 = tickets - pred\_tickets\_wk\_1)

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_tickets\_wk\_1 = predict(reg\_mod1, new\_weather\_film)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

**17.a** OLS;

www\_columns <- str\_subset(colnames(weather\_film), "www\_")  
  
  
# Create a copy of the original dataframe  
df <- weather\_film   
  
# Define regression formula with dummy variables  
regressors <- glue("~ {weekend\_dummy} + {week\_dummy} + {year\_dummy} + {holiday\_dummy}")  
  
# Iterate over columns with names containing "www\_"  
for (columns in www\_columns) {  
 # Construct regression formula  
 model <- paste(columns, regressors)  
   
 # Generate names for predicted values and residuals  
 pred\_name <- paste("pred", columns, sep = "\_")  
 resid\_name <- paste("resid", columns, sep = "\_")  
   
 # Add predicted values and residuals to the dataframe  
 df <- df |>   
 mutate(!!pred\_name := predict(lm(as.formula(model), data = df), df)) |>   
 #residuals = column - predicted\_value\_for\_column  
 mutate(!!resid\_name := eval(parse(text = columns)) - eval(parse(text = pred\_name)))  
}

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_snow\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_rain\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_10\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_15\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_20\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_25\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_30\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_35\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_40\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_45\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_50\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_55\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_60\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_65\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_70\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_75\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_80\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_85\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_90\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_95\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_0\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_1\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_2\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_3\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_4\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_5\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_0\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_1\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_2\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_3\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_4\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_5\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_6\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_7\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_8\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat\_la\_0 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat\_la\_cens\_0 = predict(lm(as.formula(model), data =  
## df), df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_snow\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_rain\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_10\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_15\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_20\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_25\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_30\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_35\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_40\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_45\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_50\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_55\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_60\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_65\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_70\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_75\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_80\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_85\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_90\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_95\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_0\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_1\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_2\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_3\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_4\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_5\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_0\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_1\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_2\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_3\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_4\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_5\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_6\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_7\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_8\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat\_la\_5 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat\_la\_cens\_5 = predict(lm(as.formula(model), data =  
## df), df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_snow\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_rain\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_10\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_15\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_20\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_25\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_30\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_35\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_40\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_45\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_50\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_55\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_60\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_65\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_70\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_75\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_80\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_85\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_90\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat5\_95\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_0\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_1\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_2\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_3\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_4\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_prec\_5\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_0\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_1\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_2\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_3\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_4\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_5\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_6\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_7\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_cloud\_8\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat\_la\_6 = predict(lm(as.formula(model), data = df),  
## df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

## Warning: There was 1 warning in `mutate()`.  
## ℹ In argument: `pred\_www\_mat\_la\_cens\_6 = predict(lm(as.formula(model), data =  
## df), df)`.  
## Caused by warning in `predict.lm()`:  
## ! prediction from rank-deficient fit; attr(\*, "non-estim") has doubtful cases

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#movies <- read\_csv("data/movie\_lens\_20m/movie.csv")  
#ratings <- read\_csv("data/movie\_lens\_20m/rating.csv")