

ST 558 Homework 4

Alise Miller

Task 1 Conceptual Questions

{r} this was one I was trying to make a list for my responses task_1_QandA <- list("Question 1" = "The purpose of lapply() is to be able to use apply() to lists and lists elements. The equivalent purrr function is map().", "Question 2" = "lapply(my_list, cor, method = "kendall")", "Question 3" = "Two advantages to using purrr: 1) more consistency and some helper functions. 2) able to use "shortcut"/ short hand formula code.", "Question 4", "A side effect function is a functions that doesn't try to change the data, but it does try to produce something. Examples seen in the note: print(), or write.csv().", "Question 5" = "I can name a variable sd in a function and not cause any issues with the sd function because they are stored in different objects or locations. Like they represent two different things. One is a variable I came up with in my R while the function is one that everyone can use that is not locally stored.")

Question 1 What is the purpose of lapply()? What is the equivalent purrr function?

The purpose of lapply() is to be able to use apply() to lists and lists elements. The equivalent purrr function is map().

Question 2 Suppose my_list

```
lapply(my_list, cor, method = "kendall")
```

Question 3 Advantages of using purrr functions

Two advantages to using purrr: 1) more consistency and some helper functions. 2) able to use "shortcut"/ short hand formula code.

Question 4 Side-effect function?

A side effect function is a functions that doesn't try to change the data, but it does try to produce something. Examples seen in the note: print(), or write.csv().

Question 5 sd as a variable and sd function

I can name a variable sd in a function and not cause any issues with the sd function because they are stored in different objects or locations. Like they represent two different things. One is a variable I came up with in my R while the function is one that everyone can use that is not locally stored.

Task 2 - Writing R Functions

Question 1 Write function getRMSE()

```
getRMSE <- function (y, y_hat, ...) { #y=actual responses y_hat=predictions
  diff_sq <- (y-y_hat)^2 #difference and squared
  mean_diff_sq <- mean(diff_sq,...) #the mean of diffs
  rmse <- sqrt(mean_diff_sq)
  return(rmse)
}
```

Question 2 Root Mean Square Error

```
set.seed(10)
n <- 100
x <- runif(n)
resp <- 3 + 10*x + rnorm(n)
pred <- predict(lm(resp ~ x), data.frame(x))
```

```
getRMSE (resp, pred) #without specifying
```

```
[1] 0.9581677
```

```
resp[1] <- NA_real_ #changing to make element 1 NA
resp[2] <- NA_real_ #changing to make element 2 NA
```

```
getRMSE (resp, pred)
```

```
[1] NA
```

```
getRMSE (resp, pred, na.rm = TRUE) #with specifying NA treatment
```

```
[1] 0.9661699
```

Question 3 Mean Absolute Deviation

```
getMAE <- function (y, y_hat, ...) { #y=actual responses y_hat=predictions "... used to add more rules later
  absolute_diff <- abs(y-y_hat) #difference and abs val
  MAE <- mean(absolute_diff,...) #the mean of diffs
  return(MAE)
}
```

Question 4 Testing MAE

```
set.seed(10)
n <- 100
x <- runif(n)
resp <- 3 + 10*x + rnorm(n)
pred <- predict(lm(resp ~ x), data.frame(x))
```

```
getMAE(resp, pred) #testing MAE
```

```
[1] 0.8155776
```

```
#replacing two values with NA_real_
resp[1] <- NA_real_ #hopefully replacing element 1 w/ NA
resp[2] <- NA_real_ #hopefully replacing element 2 w/ NA
```

```
getMAE(resp, pred) #w/o
```

```
[1] NA
```

```
getMAE(resp, pred, na.rm = TRUE) #w/specifying
```

```
[1] 0.8241201
```

Question 5 Wrapper Function

```
my_wrapper <- function( y, y_hat, metrics = c("RMSE", "MAE"), ...) {
  if (!is.numeric(y) || !is.numeric(y_hat)) {
    stop("Error: Both y and y_hat must be numeric vectors.")
  }
  if (!is.atomic(y) || !is.atomic(y_hat)) {
    stop("Error: Both y and y_hat must be atomic vectors.")
  }
  if (!is.vector(y) || !is.vector(y_hat)) {
    stop("Error: Both y and y_hat must be vectors.")
  }
  results <- list()
  if ("RMSE" %in% metrics) {
    results$RMSE <- getRMSE(y, y_hat)
  }
  if ("MAE" %in% metrics) {
    results$MAE <- getMAE(y, y_hat)
  }
  return(results)
}
```

Question 6 Testing Wrapper

```
set.seed(10)
n <- 100
x <- runif(n)
resp <- 3 + 10*x + rnorm(n)
pred <- predict(lm(resp ~ x), data.frame(x))
```

```
my_wrapper(resp, pred, "RMSE") # 1 result at a time RMSE
```

```
$RMSE
[1] 0.9581677
```

```
my_wrapper(resp, pred, "MAE") #1 result at a time MAE
```

```
$MAE
[1] 0.8155776
```

```
my_wrapper(resp, pred) #calling both
```

```
$RMSE
[1] 0.9581677
```

```
$MAE
[1] 0.8155776
```

```
#replacing two values with NA_real_
resp[1] <- NA_real_ #hopefully replacing element 1 w/ NA
resp[2] <- NA_real_ #hopefully replacing element 2 w/ NA
```

```
my_wrapper(resp, pred, "RMSE") # 1 result at a time RMSE
```

```
$RMSE
[1] NA
```

```
my_wrapper(resp, pred, "MAE") #1 result at a time MAE
```

```
$MAE
[1] NA
```

```
my_wrapper(resp, pred) #calling both
```

```
$RMSE
[1] NA
```

```
$MAE
[1] NA
```

```
my_wrapper(iris$Sepal.Length, iris$Species) (echo = FALSE)
```

Error in my_wrapper(iris\$Sepal.Length, iris\$Species): Error: Both y and y_hat must be numeric vectors.

```
#testing for error
```

Task 3

Question 1 GET()

```
#install.packages("httr")
library(httr)
library(jsonlite)
```

```
URL_ids <-
"https://newsapi.org/v2/top-headlines?country=us&category=health&apiKey=6cbf1ccd7a26414fb634a04a7fef4f91"
id_info <- GET(URL_ids)
str(id_info)
```

List of 10

```
$ url      : chr "https://newsapi.org/v2/top-headlines?country=us&category=health&apiKey=6cbf1ccd7a26414fb634a04a7fef4f91"
$ status_code: int 200
$ headers   :List of 15
..$ date      : chr "Wed, 25 Jun 2025 03:00:06 GMT"
..$ content-type : chr "application/json; charset=utf-8"
..$ transfer-encoding: chr "chunked"
..$ connection  : chr "keep-alive"
..$ content-encoding : chr "gzip"
..$ cache-control : chr "no-cache"
..$ pragma      : chr "no-cache"
..$ expires     : chr "-1"
..$ x-cached-result : chr "false"
..$ cf-cache-status : chr "DYNAMIC"
..$ report-to    : chr "{\"endpoints\": [{\"url\": \"https://a.nel.cloudflare.com/report/v4?s=j0eDis\"}]"
..$ nel         : chr "{\"success_fraction\": 0, \"report_to\": \"cf-nel\", \"max_age\": 604800}"
..$ server      : chr "cloudflare"
..$ cf-ray      : chr "955136736caf677b-ATL"
..$ server-timing : chr "cfL4;desc=?proto=TCP&rtt=34581&min_rtt=30521&rtt_var=14346&sent=5&recv=6&lost=0&"
.- attr(*, "class")= chr [1:2] "insensitive" "list"
$ all_headers:List of 1
..$ :List of 3
.. ..$ status : int 200
.. ..$ version: chr "HTTP/1.1"
.. ..$ headers:List of 15
.. .. ..$ date      : chr "Wed, 25 Jun 2025 03:00:06 GMT"
.. .. ..$ content-type : chr "application/json; charset=utf-8"
.. .. ..$ transfer-encoding: chr "chunked"
.. .. ..$ connection  : chr "keep-alive"
.. .. ..$ content-encoding : chr "gzip"
```

```

.. .. ..$ cache-control      : chr "no-cache"
.. .. ..$ pragma             : chr "no-cache"
.. .. ..$ expires            : chr "-1"
.. .. ..$ x-cached-result    : chr "false"
.. .. ..$ cf-cache-status    : chr "DYNAMIC"
.. .. ..$ report-to          : chr "{\"endpoints\": [{\"url\": \"https:\\\\a.nel.cloudflare.com\\\\report\\\\v4?s=
.. .. ..$ nel                 : chr "{\"success_fraction\":0,\"report_to\": \"cf-nel\", \"max_age\":604800}"
.. .. ..$ server              : chr "cloudflare"
.. .. ..$ cf-ray             : chr "955136736caf677b-ATL"
.. .. ..$ server-timing       : chr "cfl4;desc=\\\"?proto=TCP&rtt=34581&min_rtt=30521&rtt_var=14346&sent=5&recv=6&l
.. .. ..- attr(*, "class")= chr [1:2] "insensitive" "list"
$ cookies      : 'data.frame':  0 obs. of  7 variables:
..$ domain      : logi(0)
..$ flag        : logi(0)
..$ path        : logi(0)
..$ secure      : logi(0)
..$ expiration: 'POSIXct' num(0)
..$ name        : logi(0)
..$ value       : logi(0)
$ content      : raw [1:13801] 7b 22 73 74 ...
$ date         : POSIXct[1:1], format: "2025-06-25 03:00:06"
$ times        : Named num [1:6] 0 0.0817 0.114 0.1586 0.4278 ...
..- attr(*, "names")= chr [1:6] "redirect" "namelookup" "connect" "pretransfer" ...
$ request      :List of 7
..$ method      : chr "GET"
..$ url         : chr "https://newsapi.org/v2/top-headlines?country=us&category=health&apiKey=6cbf1ccd7a26414fb6
..$ headers     : Named chr "application/json, text/xml, application/xml, */*"
.. ..- attr(*, "names")= chr "Accept"
..$ fields      : NULL
..$ options     :List of 2
.. ..$ useragent: chr "libcurl/8.10.1 r-curl/6.2.3 http/1.4.7"
.. ..$ httpget  : logi TRUE
..$ auth_token  : NULL
..$ output      : list()
.. ..- attr(*, "class")= chr [1:2] "write_memory" "write_function"
..- attr(*, "class")= chr "request"
$ handle       :Class 'curl_handle' <externalptr>
- attr(*, "class")= chr "response"

```

Question 2 Parsing

```

library(jsonlite)
library(tidyverse)

```

```

-- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
v dplyr      1.1.4      v readr      2.1.5
v forcats    1.0.0      v stringr    1.5.1
v ggplot2    3.5.2      v tibble     3.2.1
v lubridate  1.9.4      v tidyr      1.3.1
v purrr      1.0.4
-- Conflicts ----- tidyverse_conflicts() --

```

```
x dplyr::filter() masks stats::filter()
x purrr::flatten() masks jsonlite::flatten()
x dplyr::lag() masks stats::lag()
i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
parsed <-fromJSON(rawToChar(id_info$content))
article_info <-as_tibble(parsed$articles)
article_info[[3]]
```

```
[1] "FDA approves HIV drug based on University of Utah biochemist's findings - KSL News"
[2] "The #1 Underrated Food to Increase Your Magnesium Intake, According to Dietitians - EatingWell"
[3] "Scientists Have Figured Out Exactly How Much Time Drinking Takes Off Your Life - AOL.com"
[4] "Severe bedbug infestation spreads through Coolidge Corner condo building - Brookline.News"
[5] "Fat composition in ketogenic diet may influence outcomes in MS - Multiple Sclerosis News Today"
[6] "Want to know how long you'll live? This 10-second sit-stand test might have the answer - Times of India"
[7] "The #1 Supplement to Support Gut Health, Recommended by a Gastroenterologist - EatingWell"
[8] "Where in Maine are you most likely to get a dangerous tick bite? - The Portland Press Herald"
[9] "Frequent Nightmares Linked to Faster Aging and Premature Death - Gizmodo"
[10] "6 Things Women over 50 Should Do Every Night Before Bed, According to Dietitians - AOL.com"
[11] "Column | We asked an oncologist: Should we worry about endocrine disruptors? - The Washington Post"
[12] "Cat Parasite Can Seriously Disrupt Brain Function, Study Suggests - ScienceAlert"
[13] "Can creatine supplements make you fat? Doctor busts 4 myths, shares tips to use it effectively | Health - I"
[14] "1 Nutrient You're Likely Not Eating Enough of on a High-Protein Diet - TODAY.com"
[15] "Struggling with knee pain? Dr Shriram Nene shares 6 tips that could save your joints - financialexpress.com"
[16] "The truth about using cannabis for health problems - The Washington Post"
```

Question 3 Query Function

```
library(httr)
my_api_query <- function (title, date, api_key){
  starting_url <- "https://newsapi.org/v2/everything"
  responses <-GET(url = starting_url, query= list( q = title,
    from = date, apiKey=api_key))

  parsed_my_query <-fromJSON(rawToChar(responses$content))
  article_title <- as_tibble(parsed_my_query$articles)
  return(article_title)
}
```

```
my_api_res1 <- my_api_query("measles", "2025-06-16", "6cbf1ccd7a26414fb634a04a7fef4f91")
#this one was to see if it worked
```

```
my_api_res1
```

```
# A tibble: 92 x 8
  source$id $name author title description url urlToImage publishedAt content
<chr> <chr> <chr> <chr> <chr> <chr> <chr> <chr>
1 the-verge The ~ Laure~ RFK ~ "Last Nove~ http~ https://p~ 2025-06-18~ "RFK J~
2 <NA> Yaho~ <NA> Map ~ <NA> http~ <NA> 2025-06-20~ "If yo~
3 <NA> Tech~ Dark ~ In T~ "The secon~ http~ https://w~ 2025-06-16~ "from ~
```

```
my_api_res2 <- my_api_query("gamestop", "2025-06-16", "6cbf1ccd7a26414fb634a04a7fef4f91")
#this one was for the directions of gamestop and
#pick a date in 30 day parameter

my_api_res2 #everything
```

```
my_api_res2[[4]] #titles
```

8

[20] "To tak dziwne, że aż niewiarygodne. W Stanach Zjednoczonych doszło do spektakularnej kradzieży konsol Nint
[21] "Samsung 1TB Pro Plus microSD Card (180MB/s) \r\n \$70 (was \$120) | Best price to date \r\nGet deal at Amazon
[22] " 12 ."
[23] "Ein LKW voller Switch-2-Konsolen ist spurlos verschwunden - irgendwo zwischen Nintendo und GameStop. Knapp
[24] "Nos EUA, um roubo de \"brinquedos\" envolvendo 2.800 consoles Switch 2 resultou em um prejuízo de mais de 1
[25] " "
[26] "Fans in den USA erleben Frust: Nagelneue Switch 2 mit Löchern im Display. GameStop tackert Kassenbon direkt
[27] "Un furto clamoroso ha colpito la filiera distributiva della Nintendo Switch 2, e non in un magazzino blind
[28] "Gearbox and 2K today opened Borderlands 4 pre-orders, with the rather unexpected \$69.99 base game price res
[29] "Borderlands 4 is up for pre-order, including the Collector's Edition. However, there is only one way to ge
[30] "Gearbox and 2K today opened Borderlands 4 pre-orders, with the rather unexpected \$69.99 base game price res
[31] NA
[32] " - Borderlands 4, "
[33] "I negozi gamelife e GameStop accettano ora anche il ritiro di retrogaming per PlayStation 2, Nintendo Wii,
[34] "Borderlands 4 Standard Edition \r\n \$70 \r\nPreorder at Best Buy (PS5) Preorder at Best Buy (Xbox) Preorder
[35] "Nasdaq-listed Genius Group grows Bitcoin treasury by 52% in a month, after a favorable court order allowed
[36] " , "
[37] " 3 Nintendo Switch 2. - Nintendo Gam
[38] " Switch 2 [...] \r\nThe post Switch 2 140 appeared first on ."
[39] "The Nintendo Switch 2 is a hot commodity, so much so that the theft of the console in large quantities sho
[40] "IT 6 18 Switch 2 500 IT 3594 6 8 8 1191 1 1
[41] "A fresh Nintendo Switch 2 restock has finally made the console available to buy again, with buyers finding
[42] "Rune Factory: Guardians of Azuma - Earth Dancer Edition (Switch) \r\n \$100 | Restocked on June 20 \r\nSee a
[43] "A delivery truck driver had a nasty surprise earlier today in Colorado when he discovered that someone had
[44] "Un vol spectaculaire a eu lieu aux États-Unis : 2 810 consoles Nintendo Switch 2, d'une valeur de 1,4 mill.
[45] "As the price of bitcoin rallies above \$100,000, a host of companies are harnessing public markets via SPAC
[46] "Nintendo Switch 2 har nyligen lanserats. Men för invånare i Grapevine, Texas, kan det ta längre tid att få
[47] "Amazon is now offering the officially-licensed HORI Compact Carry All Travel Bag for Nintendo Switch 2 dow
[48] "Nintendo Switch 2 stock is back in action this week, with planned drops across both the US and UK, here's a
[49] "Or you can wait until January when you will probably be able to pick it up for \$40"
[50] "While US debt soared to \$37 trillion, BTC quietly rose from zero to a trillion-dollar asset, reshaping glo
[51] "A brand new co-op game known as Peak is topping the sales charts on Steam after going viral. There are so m
[52] "Some of the holiday's best discounts are already live. Browse the 65 best 4th of July sales on mattresses,
[53] "Retirement Systems of Alabama increased its position in GameStop Corp. (NYSE:GME -
Free Report) by 0.2% in the 1st quarter, HoldingsChannel reports. The institutional investor owned 494,867 shares
[54] "GameStop (NYSE:GME) has outperformed the market over the past 5 years by 67.1% on an annualized basis produ
[55] " NS2 \r\n· GameStop -- ns2
[56] "Parataxis is launching a Bitcoin treasury platform for South Korean institutional investors, which saw Bri
[57] "Podcaster Anthony Pompliano has raised \$750 million to take his crypto company public via a SPAC merger to
[58] "\nPolicisté v americkém Coloradu vyšetřují kuriózní loupež, při které se z kamionu ztratilo téměř 3
[59] "GameStop Corp (NYSE:GME) shares were trading up approximately 2.7% at \$23.61 Wednesday afternoon as invest
[60] "Nakamoto and KindlyMD plan to merge for a bitcoin treasury strategy, joining a BTC balance sheet trend with
[61] "Most of the time, a new Pokemon TCG release finds fans strategizing about which store is most likely to hav
[62] "The company will spend up to \$1 billion to establish a Bitcoin treasury."
[63] "Dozens of single-stock ETFs using leverage have recently been filed with the Securities and Exchange Commi
[64] "so i've got a chronic pain condition that makes office chairs hurt, but that is never triggered while I'm c
[65] "Walmart, GameStop, and Colgate-Palmolive are the three Ecommerce stocks to watch today, according to Marke
[66] "Walmart, GameStop, and Colgate-Palmolive are the three Ecommerce stocks to watch today, according to Marke
[67] "GameStop, Alibaba Group, and Roblox are the three Entertainment stocks to watch today, according to Market
[68] "Earlier this month, fans began to speculate that big news about the next game in the Call of Duty franchise
[69] "Best Buy has restocked the Nintendo Switch 2, giving you yet another opportunity to buy the console. Anytin
[70] "Today, 2K and Gearbox Software opened up pre-orders for the next installment of the Borderlands franchise,
[71] "Costco Wholesale, Walmart, GameStop, Target, Take-Two Interactive Software, Kroger, and Dollar Tree are the
often micr..."

[72] "Meta Platforms, GameStop, Best Buy, Unity Software, EPAM Systems, Ambarella, and Everbright Digital are the
[73] "Walmart, GameStop, Colgate-Palmolive, BellRing Brands, and W.W. Grainger are the five Ecommerce stocks to v
[74] "Walt Disney, Alibaba Group, GameStop, Roblox, and SEA are the five Entertainment stocks to watch today, acc
[75] "Meta Platforms, GameStop, and Best Buy are the three Virtual Reality stocks to watch today, according to M
[76] "Walmart, GameStop, Colgate-Palmolive, W.W. Grainger, BellRing Brands, Post, and Regal Rexnord are the sever
[77] "Meta Platforms, GameStop, Best Buy, Unity Software, and EPAM Systems are the five Virtual Reality stocks to
[78] "Direxion Daily TSLA Bull 2X Shares, Oklo, GameStop, RH, and Archer Aviation are the five Mid Cap stocks to
[79] "Meta Platforms, GameStop, and Unity Software are the three Virtual Reality stocks to watch today, according
[80] "Meta Platforms, GameStop, Best Buy, Unity Software, EPAM Systems, Ambarella, and POET Technologies are the
[81] "Elden Ring Nightreign è protagonista di un nuovo contest grafico organizzato da gamelife GameStop, che con
[82] "Donkey Kong Bananza \r\n \$70 | Releases July 17 \r\nPreorder at Amazon Preorder at Walmart Preorder at Bes
[83] ""
[84] ""
[85] ""
[86] ""
[87] ""
[88] ""
[89] ""
[90] ""
[91] ""
[92] ""
[93] ""
[94] ""
[95] ""
[96] ""
[97] ""
[98] "More to come....."
[99] ""