HomeworkIterationsFunctions

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#(5\*degree\_f - 32)/9  
(5\*(10 - 32)/9)

## [1] -12.22222

(5\*(36 - 32)/9)

## [1] 2.222222

(5\*(39 - 32)/9)

## [1] 3.888889

(5\*(40 - 32)/9)

## [1] 4.444444

(5\*(42 - 32)/9)

## [1] 5.555556

# Creating a function   
  
F\_to\_C <- function(f\_temp){ #f\_temp is an input  
 celsius <- (5\*(f\_temp - 32)/9)  
 return(celsius) # This is for output  
}

# Function application   
  
F\_to\_C(32)

## [1] 0

F\_to\_C(80)

## [1] 26.66667

# iteration function in base R   
  
rep("A", 3)

## [1] "A" "A" "A"

rep(c("A", "B"), 10) # repeat A and B 10 times

## [1] "A" "B" "A" "B" "A" "B" "A" "B" "A" "B" "A" "B" "A" "B" "A" "B" "A" "B" "A"  
## [20] "B"

rep(c(1, 3, 2, 5), 4, each = 10) # repeat each element 10 times

## [1] 1 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 5 5 5 5 5 5 5  
## [38] 5 5 5 1 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 5 5 5 5  
## [75] 5 5 5 5 5 5 1 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 5  
## [112] 5 5 5 5 5 5 5 5 5 1 1 1 1 1 1 1 1 1 1 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2  
## [149] 2 2 5 5 5 5 5 5 5 5 5 5

# Creating a sequence of numbers  
  
1:7

## [1] 1 2 3 4 5 6 7

seq(from = 1, to = 7) # same as above

## [1] 1 2 3 4 5 6 7

seq(from = 0, to = 10, by = 2) # 0, 2, 4, 6, 8, 10

## [1] 0 2 4 6 8 10

LETTERS

## [1] "A" "B" "C" "D" "E" "F" "G" "H" "I" "J" "K" "L" "M" "N" "O" "P" "Q" "R" "S"  
## [20] "T" "U" "V" "W" "X" "Y" "Z"

seq\_along(LETTERS) # 1 to 26

## [1] 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25  
## [26] 26

# The for loop  
  
for (i in 1:10){  
 print(i\*2)  
}

## [1] 2  
## [1] 4  
## [1] 6  
## [1] 8  
## [1] 10  
## [1] 12  
## [1] 14  
## [1] 16  
## [1] 18  
## [1] 20

for (i in -30:100){  
 result <- F\_to\_C(i)  
 print(result)  
}

## [1] -34.44444  
## [1] -33.88889  
## [1] -33.33333  
## [1] -32.77778  
## [1] -32.22222  
## [1] -31.66667  
## [1] -31.11111  
## [1] -30.55556  
## [1] -30  
## [1] -29.44444  
## [1] -28.88889  
## [1] -28.33333  
## [1] -27.77778  
## [1] -27.22222  
## [1] -26.66667  
## [1] -26.11111  
## [1] -25.55556  
## [1] -25  
## [1] -24.44444  
## [1] -23.88889  
## [1] -23.33333  
## [1] -22.77778  
## [1] -22.22222  
## [1] -21.66667  
## [1] -21.11111  
## [1] -20.55556  
## [1] -20  
## [1] -19.44444  
## [1] -18.88889  
## [1] -18.33333  
## [1] -17.77778  
## [1] -17.22222  
## [1] -16.66667  
## [1] -16.11111  
## [1] -15.55556  
## [1] -15  
## [1] -14.44444  
## [1] -13.88889  
## [1] -13.33333  
## [1] -12.77778  
## [1] -12.22222  
## [1] -11.66667  
## [1] -11.11111  
## [1] -10.55556  
## [1] -10  
## [1] -9.444444  
## [1] -8.888889  
## [1] -8.333333  
## [1] -7.777778  
## [1] -7.222222  
## [1] -6.666667  
## [1] -6.111111  
## [1] -5.555556  
## [1] -5  
## [1] -4.444444  
## [1] -3.888889  
## [1] -3.333333  
## [1] -2.777778  
## [1] -2.222222  
## [1] -1.666667  
## [1] -1.111111  
## [1] -0.5555556  
## [1] 0  
## [1] 0.5555556  
## [1] 1.111111  
## [1] 1.666667  
## [1] 2.222222  
## [1] 2.777778  
## [1] 3.333333  
## [1] 3.888889  
## [1] 4.444444  
## [1] 5  
## [1] 5.555556  
## [1] 6.111111  
## [1] 6.666667  
## [1] 7.222222  
## [1] 7.777778  
## [1] 8.333333  
## [1] 8.888889  
## [1] 9.444444  
## [1] 10  
## [1] 10.55556  
## [1] 11.11111  
## [1] 11.66667  
## [1] 12.22222  
## [1] 12.77778  
## [1] 13.33333  
## [1] 13.88889  
## [1] 14.44444  
## [1] 15  
## [1] 15.55556  
## [1] 16.11111  
## [1] 16.66667  
## [1] 17.22222  
## [1] 17.77778  
## [1] 18.33333  
## [1] 18.88889  
## [1] 19.44444  
## [1] 20  
## [1] 20.55556  
## [1] 21.11111  
## [1] 21.66667  
## [1] 22.22222  
## [1] 22.77778  
## [1] 23.33333  
## [1] 23.88889  
## [1] 24.44444  
## [1] 25  
## [1] 25.55556  
## [1] 26.11111  
## [1] 26.66667  
## [1] 27.22222  
## [1] 27.77778  
## [1] 28.33333  
## [1] 28.88889  
## [1] 29.44444  
## [1] 30  
## [1] 30.55556  
## [1] 31.11111  
## [1] 31.66667  
## [1] 32.22222  
## [1] 32.77778  
## [1] 33.33333  
## [1] 33.88889  
## [1] 34.44444  
## [1] 35  
## [1] 35.55556  
## [1] 36.11111  
## [1] 36.66667  
## [1] 37.22222  
## [1] 37.77778

celsius.df <- NULL  
for (i in -30:100){  
 result <- data.frame(F\_to\_C(i), i)  
 colnames(result) <- c("C", "F")  
 celsius.df <- rbind.data.frame(celsius.df, result) # rbind is a row bind function  
}

library(tidyverse)

## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──  
## ✔ dplyr 1.1.4 ✔ readr 2.1.5  
## ✔ forcats 1.0.0 ✔ stringr 1.5.1  
## ✔ ggplot2 3.5.1 ✔ tibble 3.2.1  
## ✔ lubridate 1.9.4 ✔ tidyr 1.3.1  
## ✔ purrr 1.0.4   
## ── Conflicts ────────────────────────────────────────── tidyverse\_conflicts() ──  
## ✖ dplyr::filter() masks stats::filter()  
## ✖ dplyr::lag() masks stats::lag()  
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors

library(drc)

## Loading required package: MASS  
##   
## Attaching package: 'MASS'  
##   
## The following object is masked from 'package:dplyr':  
##   
## select  
##   
##   
## 'drc' has been loaded.  
##   
## Please cite R and 'drc' if used for a publication,  
## for references type 'citation()' and 'citation('drc')'.  
##   
##   
## Attaching package: 'drc'  
##   
## The following objects are masked from 'package:stats':  
##   
## gaussian, getInitial

EC50.data <- read.csv("EC50\_all.csv")  
  
str(EC50.data)

## 'data.frame': 2681 obs. of 12 variables:  
## $ is : chr "ILSO\_5-41c" "ILSO\_5-41c" "ILSO\_5-41c" "ILSO\_5-41c" ...  
## $ location : chr "Illinois" "Illinois" "Illinois" "Illinois" ...  
## $ trial : int 1 1 1 1 1 1 1 1 1 1 ...  
## $ set : int 1 1 1 1 1 1 1 1 1 1 ...  
## $ batch : int 2 2 2 2 2 2 2 2 2 2 ...  
## $ lat : num 39.1 39.1 39.1 39.1 39.1 ...  
## $ conc : num 0 0 0 0 0 0 0.01 0.01 0.01 0.01 ...  
## $ rep : int 1 1 2 2 3 3 1 1 2 2 ...  
## $ measure : int 1 2 1 2 1 2 1 2 1 2 ...  
## $ coldiam : num 71.5 70 72.9 70.5 68.5 ...  
## $ coldiamplug: num 67.8 66.3 69.2 66.8 64.8 ...  
## $ relgrowth : num 1.016 0.994 1.037 1.002 0.972 ...

isolate1 <- drm(100 \* EC50.data$relgrowth[EC50.data$is == "ILSO\_5-41c"] ~   
 EC50.data$conc[EC50.data$is == "ILSO\_5-41c"],   
 fct = LL.4(fixed = c(NA, NA, NA, NA),   
 names = c("Slope", "Lower", "Upper", "EC50")),   
 na.action = na.omit)

# summary.mef.fit for 'summary of fit'  
  
summary.fit <- data.frame(summary(isolate1)[[3]]) # [[]] is for extracting the third element of the summary(isolate1) function  
  
EC50 <- ED(isolate1, respLev = c(50), type = "relative",  
 interval = "delta")[[1]]

##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1070318 0.0055365 0.0957543 0.1183094

EC50.114 <- NULL  
nm <- unique(EC50.data$is)  
for (i in seq\_along(nm)) {  
 isolate1 <- drm(100 \* EC50.data$relgrowth[EC50.data$is == nm[[i]]] ~   
 EC50.data$conc[EC50.data$is == nm[[i]]],   
 fct = LL.4(fixed = c(NA, NA, NA, NA),   
 names = c("Slope", "Lower", "Upper", "EC50")),   
 na.action = na.omit)  
}  
print(nm[[i]])

## [1] "V-SDSO2\_5-41"

summary.fit <- data.frame(summary(isolate1)[[3]])  
  
EC50 <- ED(isolate1, respLev = c(50), type = "relative",   
 interval = "delta")[[1]]

##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.211026 0.012571 0.185419 0.236633

isolate.ec\_1 <- data.frame(nm[[i]], EC50)  
EC50.114 <- rbind.data.frame(EC50.114, isolate.ec\_1)  
 EC50

## [1] 0.2110257

# Using map function from purrr package  
  
EC50.data %>%  
 group\_by(is) %>%  
 nest() %>%  
 mutate(ll.4.mod = map(data, ~drm(.$relgrowth ~ .$conc, # map told us that it iterate and '.' symbol inherits all the data columns from previous dataset  
 fct = LL.4(fixed = c(NA, NA, NA, NA),   
 names = c("Slope", "Lower", "Upper", "EC50"))))) %>%  
 mutate(ec50 = map(ll.4.mod, ~ED(.,   
 respLev = c(50),   
 type = "relative",  
 interval = "delta")[[1]])) %>%  
 unnest(ec50)

## Warning: There were 19 warnings in `mutate()`.  
## The first warning was:  
## ℹ In argument: `ll.4.mod = map(...)`.  
## ℹ In group 4: `is = "C-MNSO2\_2-10"`.  
## Caused by warning in `log()`:  
## ! NaNs produced  
## ℹ Run `dplyr::last\_dplyr\_warnings()` to see the 18 remaining warnings.

##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.106855 0.022010 0.062022 0.151687  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.177036 0.011915 0.152767 0.201305  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.234268 0.017095 0.199447 0.269088  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.0172659 0.0012838 0.0146508 0.0198809  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.117014 0.012255 0.092052 0.141977  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.147113 0.008233 0.130343 0.163883  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1376907 0.0077899 0.1218232 0.1535582  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.118886 0.004502 0.109716 0.128057  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.206342 0.016866 0.171988 0.240696  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.175509 0.013954 0.147086 0.203932  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.65376 0.63282 -0.63525 1.94277  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.118335 0.011733 0.094404 0.142265  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.189945 0.013146 0.163097 0.216793  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.0483296 0.0022658 0.0437143 0.0529448  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.190146 0.027182 0.134779 0.245514  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.16580 0.01082 0.14376 0.18784  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.183297 0.017237 0.148187 0.218407  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.130147 0.010705 0.108342 0.151951  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1915200 0.0077369 0.1757605 0.2072795  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.123034 0.006696 0.109395 0.136673  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1935594 0.0094277 0.1743559 0.2127629  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.198000 0.019219 0.158853 0.237148  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1114482 0.0070542 0.0970793 0.1258172  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.159440 0.010423 0.138209 0.180671  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1372654 0.0070847 0.1228343 0.1516965  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1070318 0.0055365 0.0957543 0.1183094  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.248655 0.028485 0.190633 0.306678  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.167592 0.010197 0.146821 0.188362  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1082677 0.0051459 0.0977858 0.1187495  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.184271 0.036047 0.110846 0.257695  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.123288 0.014018 0.094735 0.151841  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.0998727 0.0044787 0.0907498 0.1089956  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.227432 0.040614 0.144704 0.310160  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.101863 0.003487 0.094760 0.108965  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.69465 0.39164 -0.10310 1.49240  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.113975 0.012773 0.087958 0.139993  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.217436 0.027934 0.160536 0.274335  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1102721 0.0033354 0.1034780 0.1170661  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1432333 0.0093132 0.1242629 0.1622036  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.18336 0.01293 0.15695 0.20977  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.186929 0.034023 0.117626 0.256232  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.0299288 0.0017812 0.0263007 0.0335569  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.200379 0.020104 0.159429 0.241329  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.30812 0.24033 -0.18142 0.79765  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.227103 0.019697 0.186983 0.267224  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.20009 0.01448 0.17059 0.22958  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.223966 0.058089 0.105642 0.342290  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.288001 0.074597 0.136052 0.439951  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.369422 0.077015 0.212549 0.526296  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.427766 0.230327 -0.041395 0.896927  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.0991738 0.0040323 0.0909603 0.1073874  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.156127 0.021551 0.112229 0.200025  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.308127 0.019233 0.268951 0.347304  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.201737 0.012113 0.176998 0.226476  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.306968 0.078617 0.146831 0.467105  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.289597 0.081347 0.123464 0.455730  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.213191 0.024013 0.164278 0.262104  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1352667 0.0074545 0.1200824 0.1504511  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.247784 0.036714 0.173000 0.322567  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.235268 0.026532 0.181223 0.289313  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.066926 0.010213 0.046123 0.087728  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.174492 0.010501 0.153102 0.195882  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.181951 0.028336 0.124233 0.239669  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.195576 0.013476 0.168125 0.223027  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.168410 0.010795 0.146421 0.190399  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1546980 0.0093702 0.1354373 0.1739588  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.162666 0.011066 0.140126 0.185206  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.42728 0.28840 -0.16017 1.01472  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.0900834 0.0021351 0.0857344 0.0944324  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1573077 0.0065037 0.1440602 0.1705553  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.16319 0.01761 0.12732 0.19906  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.20914 0.01403 0.18056 0.23772  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.17905 0.00849 0.16171 0.19639  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.1587569 0.0098007 0.1387411 0.1787727  
##   
## Estimated effective doses  
##   
## Estimate Std. Error Lower Upper  
## e:1:50 0.211026 0.012571 0.185419 0.236633

## # A tibble: 75 × 4  
## # Groups: is [75]  
## is data ll.4.mod ec50  
## <chr> <list> <list> <dbl>  
## 1 ILSO\_5-41c <tibble [36 × 11]> <drc> 0.107   
## 2 ILSO\_5-42c <tibble [36 × 11]> <drc> 0.249   
## 3 ILSO\_5-49b <tibble [36 × 11]> <drc> 0.168   
## 4 ILSO\_6-1 <tibble [36 × 11]> <drc> 0.108   
## 5 ILSO\_6-12B <tibble [36 × 11]> <drc> 0.184   
## 6 ILSO\_6-2b <tibble [36 × 11]> <drc> 0.227   
## 7 ILSO\_6-33C <tibble [36 × 11]> <drc> 0.102   
## 8 ILSO\_6-39C <tibble [36 × 11]> <drc> 0.110   
## 9 ILSO\_6-15b <tibble [36 × 11]> <drc> 0.123   
## 10 ILSO\_6-28C <tibble [36 × 11]> <drc> 0.0999  
## # ℹ 65 more rows