

# Coding Challenge 6

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*# Regarding reproducibility, what is the main point of writing your own functions and iterations?*  
*# the main point is to reduce copy and paste errors and to improve reproducibility. It also helps simplify*

## Question 1:

*#In your own words, describe how to write a function and a for loop in R and how they work. Give me specific examples.*  
*# to create a function, you first have to name it. Similar to what we did for the homework, the function name should be descriptive.*  
*# for loop: your code will start out as 'for ( i in x:X)'. What this means is that the i will be whatever value is in the vector x.*

## Question 2:

```
cities.data <- read.csv("C:/Users/katie/Downloads/Cities.csv")
library(tidyverse)
```

## Question 3

```
## Warning: package 'tidyverse' was built under R version 4.4.2
```

```
## Warning: package 'dplyr' was built under R version 4.4.2
```

```
## -- 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    3.5.1      v tibble     3.2.1
## v lubridate  1.9.3      v tidyr      1.3.1
## v purrr      1.0.2
## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```

distance.bet <- function(lat1, lon1, lat2, lon2){
  rad.lat1 <- lat1 * pi/180
  rad.lon1 <- lon1 * pi/180
  rad.lat2 <- lat2 * pi/180
  rad.lon2 <- lon2 * pi/180
  #Haversine formula
  delta_lat <- rad.lat2 - rad.lat1
  delta_lon <- rad.lon2 - rad.lon1
  a <- sin(delta_lat / 2)^2 + cos(rad.lat1) * cos(rad.lat2) * sin(delta_lon / 2)^2
  c <- 2 * asin(sqrt(a))
  # Earth's radius in kilometers
  earth_radius <- 6378137
  # Calculate the distance
  distance_km <- (earth_radius * c)/1000
}

```

#### Question 4

```

lat.lon.data <- subset(cities.data, city %in% c("New York", "Auburn"), select =
c(long, lat))
print(lat.lon.data)

```

#### Question 5

```

##           long      lat
## 1  -73.9249 40.6943
## 40 -85.4903 32.6087

```

```

nyc_auburn <- distance.bet(40.6943, -73.9249, 32.6087, -85.4903)
print(nyc_auburn)

```

```

## [1] 1367.854

```

```

cities.df <- NULL

for (i in 1:nrow(cities.data)) {
  result <- distance.bet(cities.data$lat[i], cities.data$long[i], 32.6087, -85.4903)
  cities.df <- rbind.data.frame(cities.df, result)
  print(cities.df)
}

```

#### Question 6

```

##      X1367.85395084397

```

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## 20	1380.1382
## 21	2961.1199
## 22	2752.8142
## 23	1092.2595
## 24	796.7541
## 25	3479.5376
## 26	1290.5492
## 27	3301.9923
## 28	1191.6657
## 29	608.2035
## 30	2504.6312
## 31	3337.2781
## 32	800.1452
## 33	1001.0879
## 34	732.5906
## 35	1371.1633
## 36	1091.8970
## 37	1043.2727
##	X1367.85395084397
## 1	1367.8540
## 2	3051.8382
## 3	1045.5213
## 4	916.4138
## 5	993.0298
## 6	1056.0217
## 7	1239.9732
## 8	162.5121
## 9	1036.9900
## 10	1665.6985
## 11	2476.2552
## 12	1108.2288
## 13	3507.9589
## 14	3388.3656
## 15	2951.3816
## 16	1530.2000



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## 32      800.1452
## 33     1001.0879
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## 37     1043.2727
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## 39     1382.3721
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## 36     1091.8970
## 37     1043.2727
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## 39     1382.3721
## 40      0.0000

```

Link to my github