

# HW6 - Loops + Functions

Nicole Dwenger

25/10/2020

## Preparations

```
# load packages
library(tidyverse)
library(gapminder)
library(stringr)

# save data as data frame
data <- as.data.frame(gapminder)
```

## Task 1

Define a defensive function that calculates the Gross Domestic Product of a nation from the data available in the gapminder dataset. Using that function, calculate the GDP of Denmark in the following years: 1967, 1977, 1987, 1997, 2007, and 2017.

```
# defensive function
gdp_calc <- function(data, country, year){
  stopifnot(country %in% data$country, # make sure the country is in the data
            year %in% data$year[data$country == country], # year for the country is in the data
            is.numeric(data$gdpPercap)) # make sure the GDP is numeric
  subset <- data[data$country == country & data$year == year,] # make subset of country and year
  gdp <- subset$gdpPercap*subset$pop # calculate gdp
  return(paste("GDP of", country, "in", year, "was", gdp)) #return it in a nice sentence
}

# calculate GDP for denmark in the following years
gdp_calc(data, "Denmark", 1967)
```

```
## [1] "GDP of Denmark in 1967 was 77116977699.724"
```

```
gdp_calc(data, "Denmark", 1977)
```

```
## [1] "GDP of Denmark in 1977 was 103920280027.729"
```

```
gdp_calc(data, "Denmark", 1987)
```

```
## [1] "GDP of Denmark in 1987 was 128771236166.089"
```

```
gdp_calc(data, "Denmark", 2007)
```

```
## [1] "GDP of Denmark in 2007 was 192906627080.569"
```

```
# gdp_calc(data, "Denmark", 2017) there is no value for 2017 in the data for Denmark
```

## Task 2

Write a script that loops over each country in the gapminder dataset, tests whether the country starts with a 'B', and print out whether the life expectancy is smaller than 50, between 50 and 70, or greater than 70. Note: I was unsure whether life expectancy here means "mean life expectancy" (just like in task 3) or whether it means "one of the life expectancy values" - but I assumed the first one.

```
# print the life expectancy test if a country does start with B
for (country in unique(data$country)) {

  # if a country starts with B
  if (str_detect(country, "^B") == TRUE) {
    # calculate the mean life expectancy
    mean_lifeExp <- mean(data$lifeExp[data$country == country])
    # and depending on the result print different things
    lifeExp <- ifelse(mean_lifeExp < 50, "smaller than 50.",
                     ifelse(mean_lifeExp > 50 & mean_lifeExp < 70, "between 50 and 70.",
                             "greater than 70.))
    print(paste("In", country, "the mean life expectancy is", lifeExp))
  }
}
```

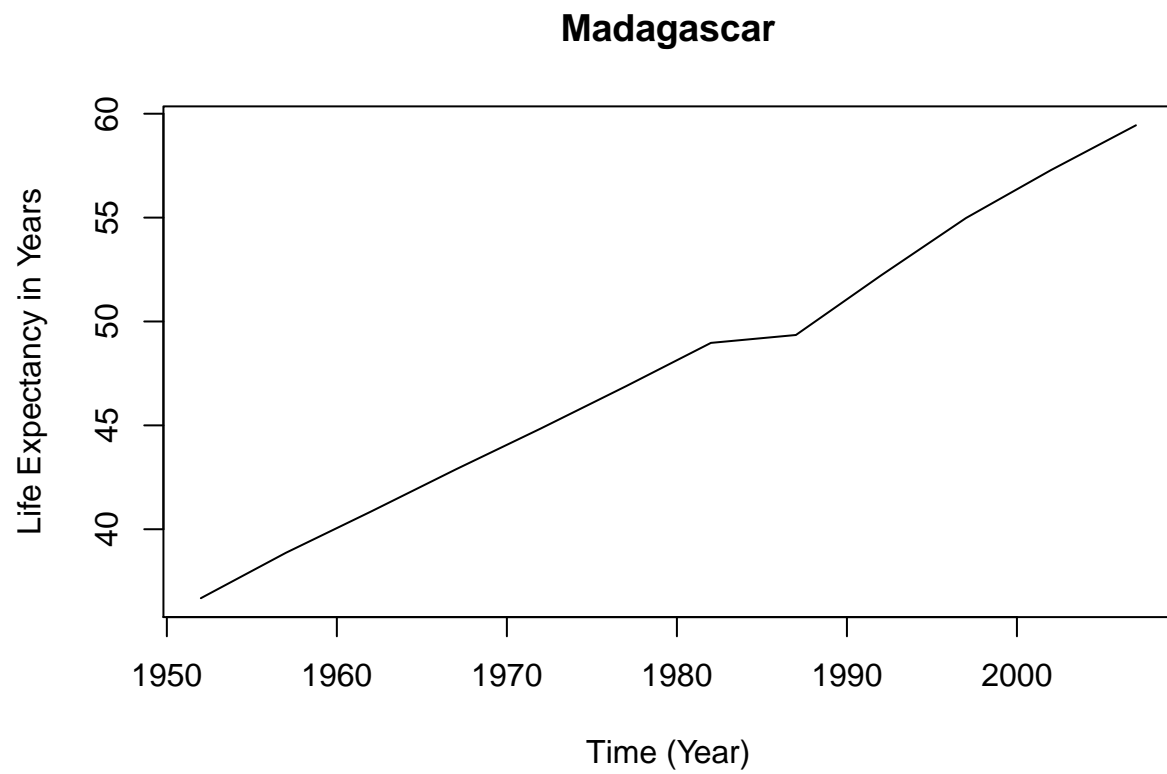
```
## [1] "In Bahrain the mean life expectancy is between 50 and 70."
## [1] "In Bangladesh the mean life expectancy is smaller than 50."
## [1] "In Belgium the mean life expectancy is greater than 70."
## [1] "In Benin the mean life expectancy is smaller than 50."
## [1] "In Bolivia the mean life expectancy is between 50 and 70."
## [1] "In Bosnia and Herzegovina the mean life expectancy is between 50 and 70."
## [1] "In Botswana the mean life expectancy is between 50 and 70."
## [1] "In Brazil the mean life expectancy is between 50 and 70."
## [1] "In Bulgaria the mean life expectancy is between 50 and 70."
## [1] "In Burkina Faso the mean life expectancy is smaller than 50."
## [1] "In Burundi the mean life expectancy is smaller than 50."
```

## Optional: Task 3

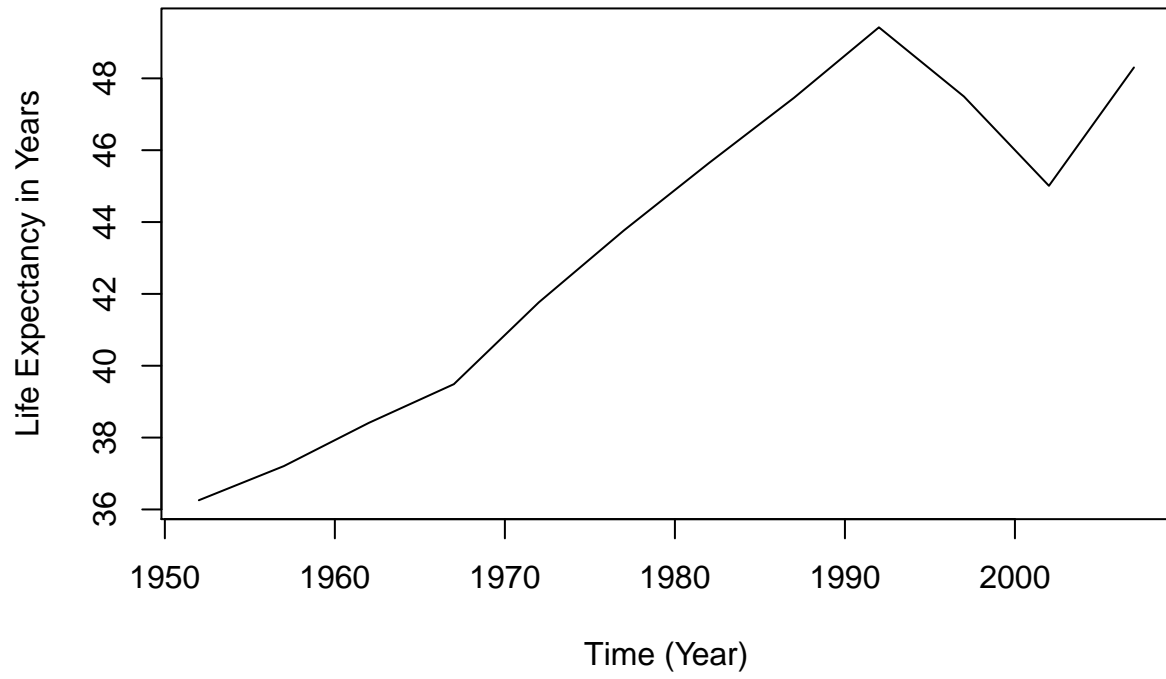
Write a script that loops over each country in the gapminder dataset, tests whether the country starts with a 'M' and graphs life expectancy against time (using plot() function) as a line graph if the mean life expectancy is under 50 years.

```
for (country in unique(data$country)) {
  if (str_detect(country, "^M") == TRUE & mean(data$lifeExp[data$country == country]) < 50) {
    subset <- data[data$country == country,]
    plot(y = subset$lifeExp, x = subset$year,
```

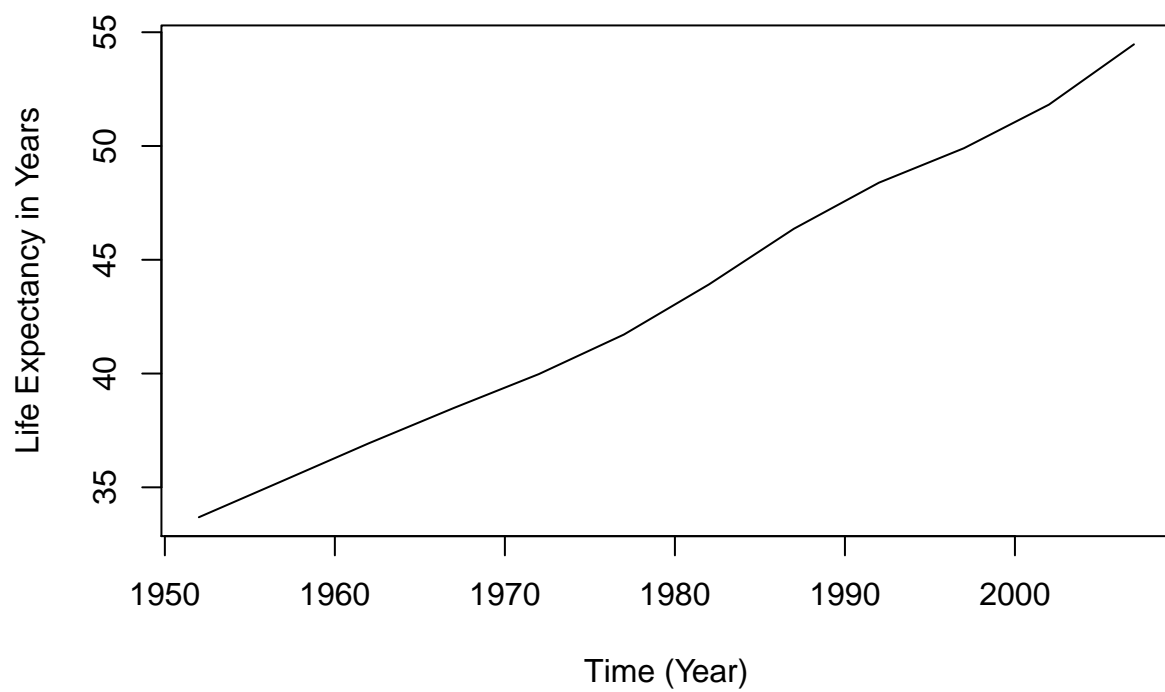
```
type = "l",  
main = country,  
ylab = "Life Expectancy in Years",  
xlab = "Time (Year)")  
}  
}
```



## Malawi



## Mali



## Mozambique

