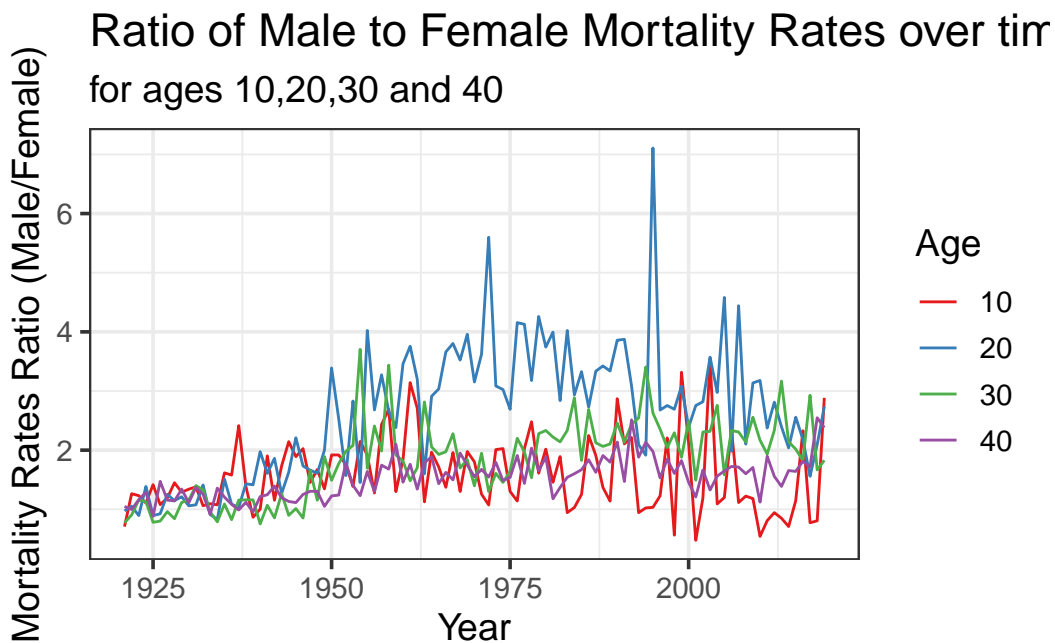# STA2201 Lab1, Ichiro Hashimoto

Exercice

1. Plot the ratio of male to female mortality rates over time for ages 10,20,30 and 40 (different color for each age) and change the theme

Solution

Exercice

2. Find the age that has the highest female mortality rate each year

Solution

```
# A tibble: 99 x 2
    Year age_max_f
   <dbl> <chr>
 1  1921 106
 2  1922 98
 3  1923 104
 4  1924 107
 5  1925 98
 6  1926 106
 7  1927 106
 8  1928 104
 9  1929 104
10  1930 105
# ... with 89 more rows
```

Exercise

3. Use the `summarize(across())` syntax to calculate the standard deviation of mortality rates by age for the Male, Female and Total populations.

Solution

```
A tibble: 111 x 4
   Age   Female   Male   Total
   <chr>   <dbl>   <dbl>   <dbl>
 1 0   0.0256   0.0330   0.0294
 2 1   0.00352   0.00396   0.00374
 3 10   0.000474 0.000561 0.000509
 4 100   0.0928   0.138   0.0729
 5 101   0.125   0.158   0.0995
 6 102   0.143   0.214   0.114
 7 103   0.252   0.371   0.208
 8 104   0.449   NA   0.363
 9 105   NA   NA   NA
10 106   NA   NA   NA
... with 101 more rows
```

**Exercise**

4. The Canadian HMD also provides population sizes over time (https://www.prdh.umontreal.ca/BDLC/data Use these to calculate the population weighted average mortality rate separately for males and females, for every year. Make a nice line plot showing the result (with meaningful labels/titles) and briefly comment on what you see (1 sentence). Hint: `left_join` will probably be useful here.

**Solution**
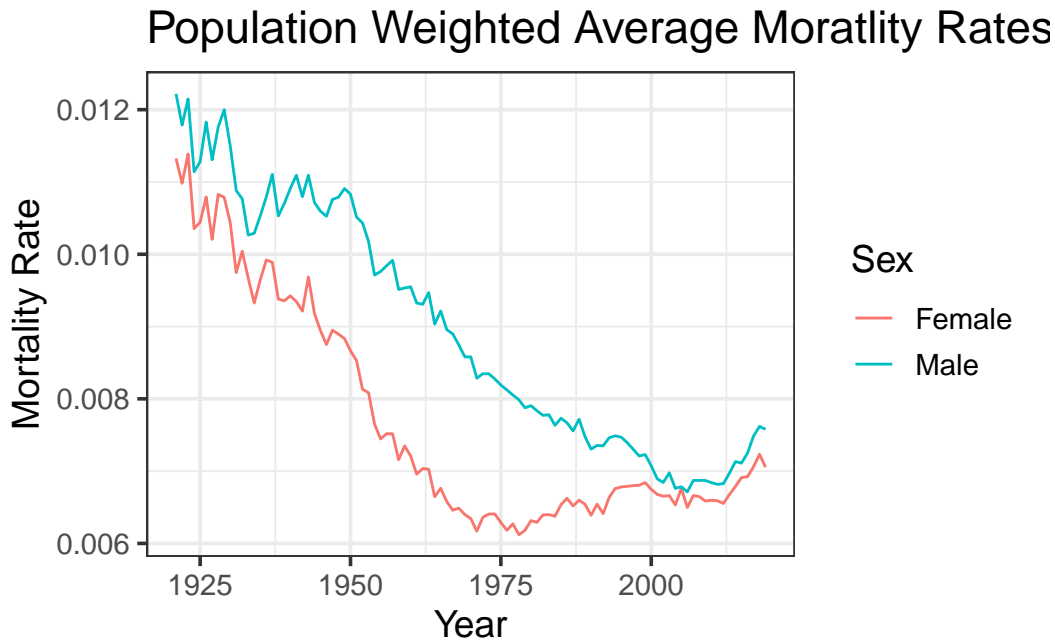


While the population weighted average mortality rates for both female and male have observed significant decline since 1925, the rates for female reached its minimum around 1975 whereas the rates for male reached its minimum early 2000 and turned to increase afterward.