

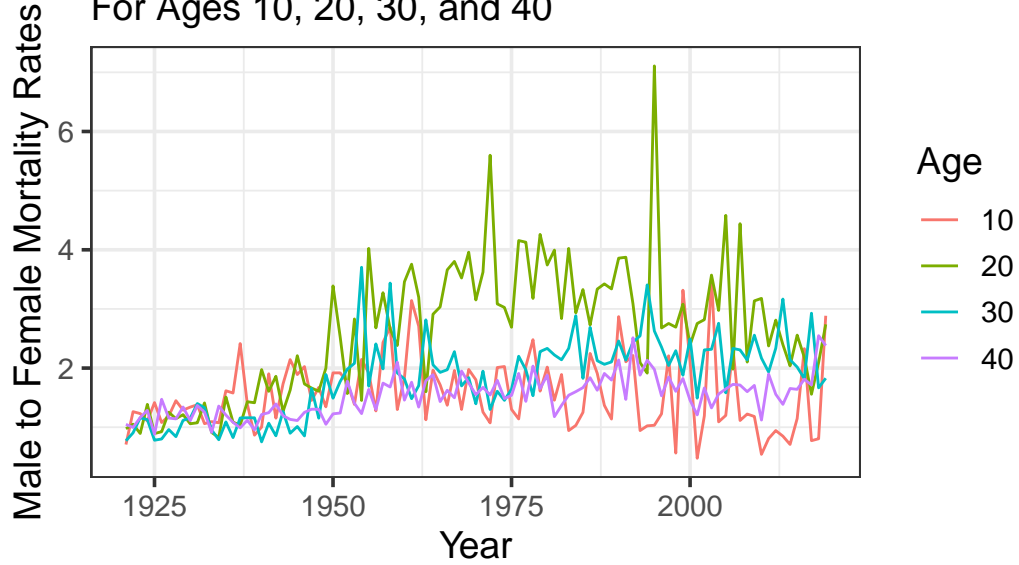
Lab1

```
library(tidyverse)
dm <- read_table("https://www.prdh.umontreal.ca/BDLC/data/ont/Mx_1x1.txt",
                 skip = 2, col_types = "dcddd")
# also read in data with Year column as double for question 3
dmd <- read_table("https://www.prdh.umontreal.ca/BDLC/data/ont/Mx_1x1.txt",
                  skip = 2, col_types = "ddddd")
```

1.

```
# add ratio column to data
pdata=dm %>%
  filter(Age==10|Age==20|Age==30|Age==40) %>%
  mutate(mf_ratio=Male/Female)
# plot
pdata %>% ggplot(aes(x=Year,y=mf_ratio,color=Age))+
  geom_line()+theme_bw(base_size=14)+
  labs(title="Ratio of Male to Female Mortality Rates Over Time",
       subtitle="For Ages 10, 20, 30, and 40",
       y="Male to Female Mortality Rates")
```

Ratio of Male to Female Mortality Rates Over Time For Ages 10, 20, 30, and 40



2.

```
dm %>% group_by(Year) %>% filter(Female==max(Female,na.rm=TRUE)) %>%
  select(Year,Age)
```

```
# A tibble: 102 x 2
# Groups:   Year [99]
   Year Age
  <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 92 more rows
```

3.

```
dmd %>% group_by(Age) %>%  
  summarize(across(c("Male", "Female", "Total"), sd, na.rm=TRUE))
```

```
# A tibble: 111 x 4  
  Age      Male    Female    Total  
  <dbl>    <dbl>    <dbl>    <dbl>  
1     0 0.0330  0.0256  0.0294  
2     1 0.00396 0.00352 0.00374  
3     2 0.00175 0.00154 0.00164  
4     3 0.00127 0.00113 0.00120  
5     4 0.000987 0.000925 0.000947  
6     5 0.000820 0.000748 0.000776  
7     6 0.000849 0.000631 0.000731  
8     7 0.000749 0.000590 0.000664  
9     8 0.000693 0.000496 0.000590  
10    9 0.000604 0.000473 0.000530  
# ... with 101 more rows
```

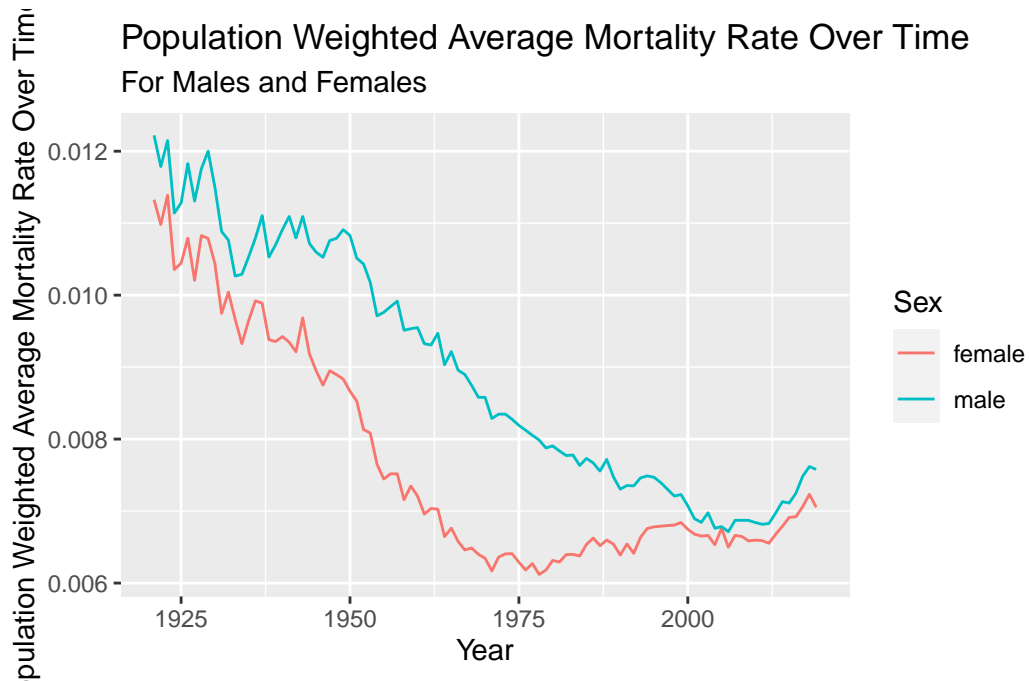
4.

```
ps=read_table("https://www.prhdh.umontreal.ca/BDLC/data/ont/Population.txt",  
              skip = 2, col_types = "dcddd")  
# reformat/rename columns  
dm4=dm %>% select(Year:Male)  
ps=rename(ps, f_pop=Female, m_pop=Male)  
# combine mortality rate and population data to calculate deaths  
comb=dm4 %>% left_join(ps) %>%  
  mutate(d_f=Female*f_pop, d_m=Male*m_pop)  
# calculate total deaths per year  
tot_deaths=comb %>% group_by(Year) %>%  
  summarise(across(c("d_f", "d_m"), sum, na.rm=TRUE))  
# calculate total population per year  
totals=ps %>% group_by(Year) %>%  
  summarize(across(c("f_pop", "m_pop"), sum, na.rm=TRUE))  
# rename columns  
totals=rename(totals, f_tot=f_pop, m_tot=m_pop)  
# calculate weighted average mortality rates  
pdata4=tot_deaths %>% left_join(totals) %>%
```

```

mutate(female=d_f/f_tot,male=d_m/m_tot) %>%
pivot_longer(female:male,names_to="Sex",values_to="Mortality")
#plot
pdata4 %>% ggplot(aes(x=Year,y=Mortality,color=Sex))+geom_line()+
  labs(title="Population Weighted Average Mortality Rate Over Time",
        subtitle="For Males and Females",
        y="Population Weighted Average Mortality Rate Over Time")

```



From the plot, we can see that the population weighted average mortality rate generally decreases over time and that females tend to have a lower population weighted average mortality rate than males.