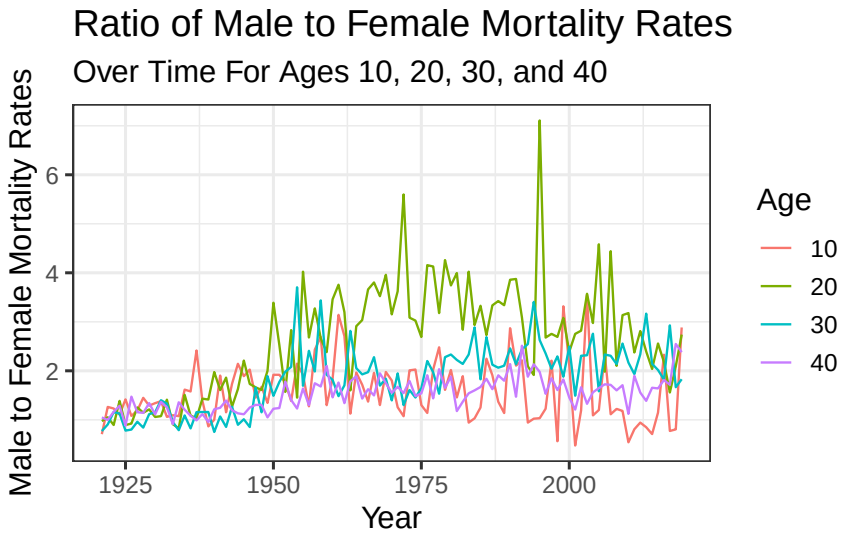
Lab1

```
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",
       subtitle="Over Time For Ages 10, 20, 30, and 40",
       y="Male to Female Mortality Rates")
```



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.

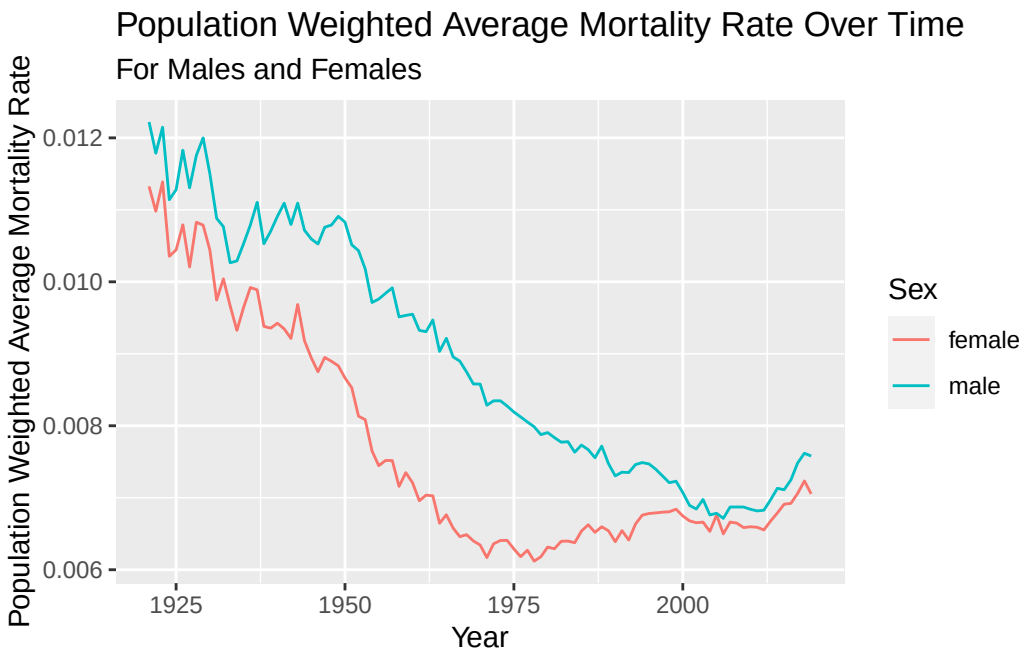
```
dmd %>% group_by(Age) %>%
  summarize(across(c("Male","Female","Total"),sd,na.rm=TRUE))
```

```
# 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.prdh.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 populaton 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")
```



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.