Lab 1: Question 1

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Importance and Context

The 2020 general election was very different from the ones that came before. It happened in the middle of a pandemic. It elected the first ever female VP. And it might have been the most polarized election in recent American history. What drove people apart, among other things, is their age.

Many people suspected that the Republicans have an older supporter base than the Democrats.

Is it just a myth or does it have some truth to it? That is what we're going to find out in this section, using the comprehensive 2020 Time Series Study from ANES (American National Election Studies).

Description of Data

From the ANES data set gathered before the election, there are 2 variables that are particularly relevant for us to answer this question, they are:

- V201018: `PARTY OF REGISTRATION`
- V201507x: `SUMMARY: RESPONDENT AGE`

We noticed for both variables, there are irrelevant answers in the data set. For `PARTY OF REGISTRATION`, we'll only keep Democrats and Republicans, and remove other parties as well as other non-answers, because we're only interested in the supporters of these two parties.

Similarly, for `SUMMARY: RESPONDENT AGE`, we will remove people who refused to answer.

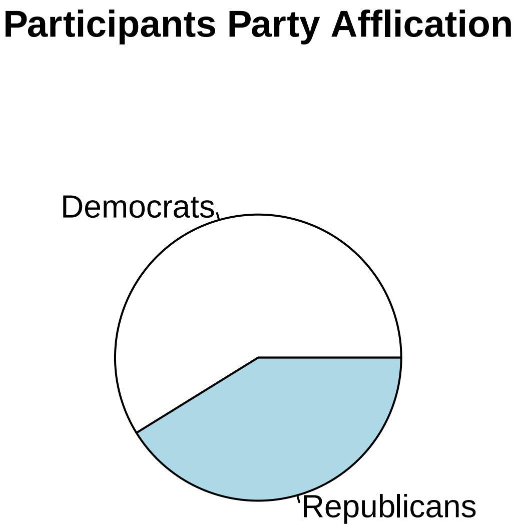
After these cleanup operations, we are left with only 3074 observations to work with.

Looking at their summaries, it looks like the variables are now all in the correct range.

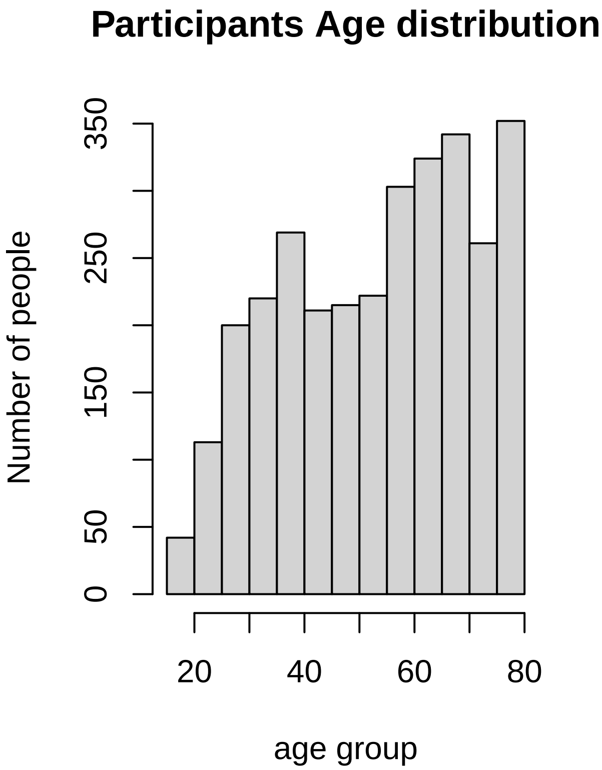
```
##      party            age       
##  Min.   :1.000   Min.   :18.00  
##  1st Qu.:1.000   1st Qu.:39.00  
##  Median :1.000   Median :56.00  
##  Mean   :1.412   Mean   :53.91  
##  3rd Qu.:2.000   3rd Qu.:68.00  
##  Max.   :2.000   Max.   :80.00  
```

From the following graphs, we can see that the number of Democrats and Republicans are not too disparate and the Age distribution is not very skewed.

Notice the age number has a hard cutoff at 80 due to the way the survey is constructed, so everyone above age 80 simply gets grouped into "80 or older" group, so actually the mean age is somewhat under-representing the true average age of the participants.

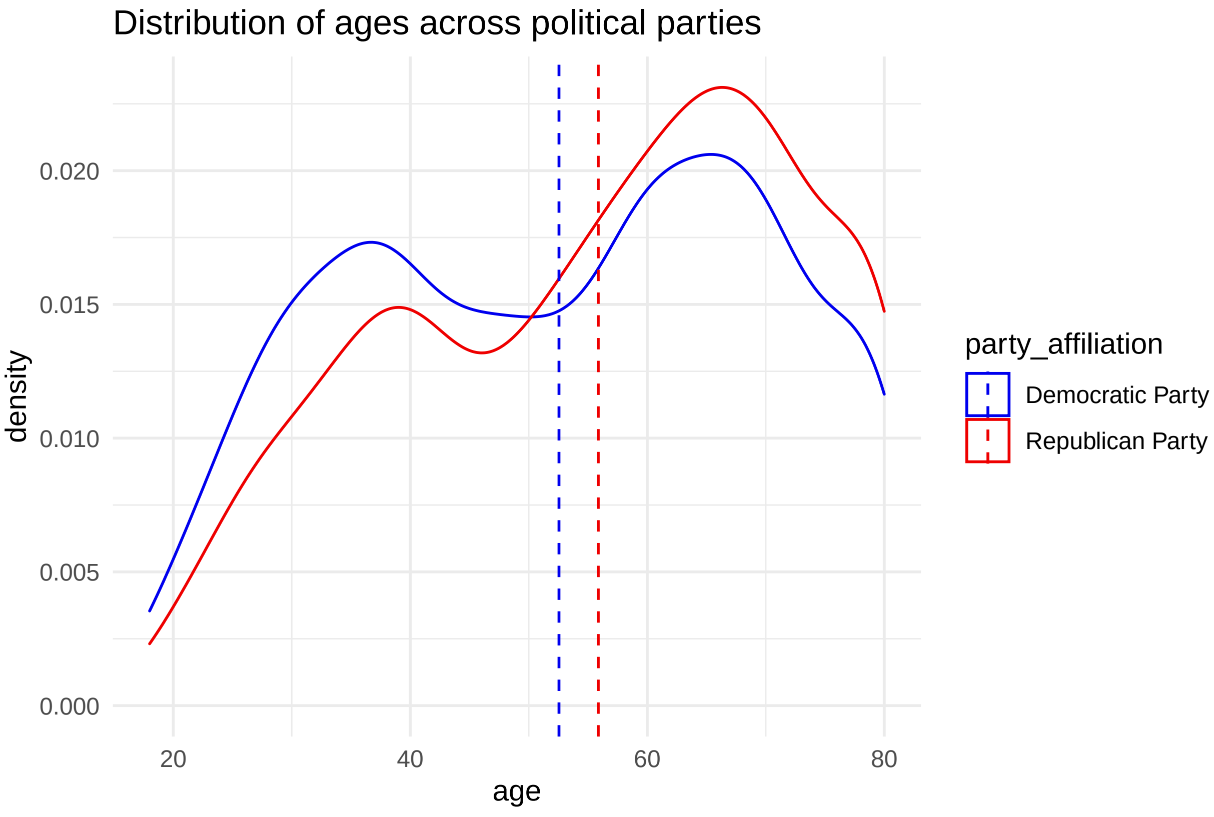


Participants Party Afflication



Participants Age distribution

Furthermore, we can also take a look at the age distribution within each Party.



Distribution of ages across political parties

The dotted lines represent the average age in each respective political party.

Most appropriate test

We have large sample, i.i.d. data, age is an interval variable so we can do t-test. Because people are not registered as Democrat and Republican at the same time, there doesn't seem to be a natural pairing going on. So we should do unpaired t-test.

Test, results and interpretation

Null hypothesis is the average age of Democrats and Republicans are the same. The alternative hypothesis is that they're not. So this should be a two tailed test.

```r
t.test(df_clean$age ~ df_clean$party)
```

```
##
##  Welch Two Sample t-test
##
## data:  df_clean$age by df_clean$party
## t = -5.3376, df = 2781.1, p-value = 1.017e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -4.531263 -2.096511
## sample estimates:
## mean in group 1 mean in group 2
##        52.54867        55.86256
```

We have very small p-value, we can reject the null and say the average ages are indeed different.