Icebreaker

What's one thing we would never guess about you?

SOC245: Visualizing Data
Precept 2: Central Tendency and Spread

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Freshman Scholars Institute
Princeton University

July 12, 2022

Recall from Lecture

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- Central tendency: mean vs. median
  - How are each defined? What different information do they provide?

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- Frequency distributions

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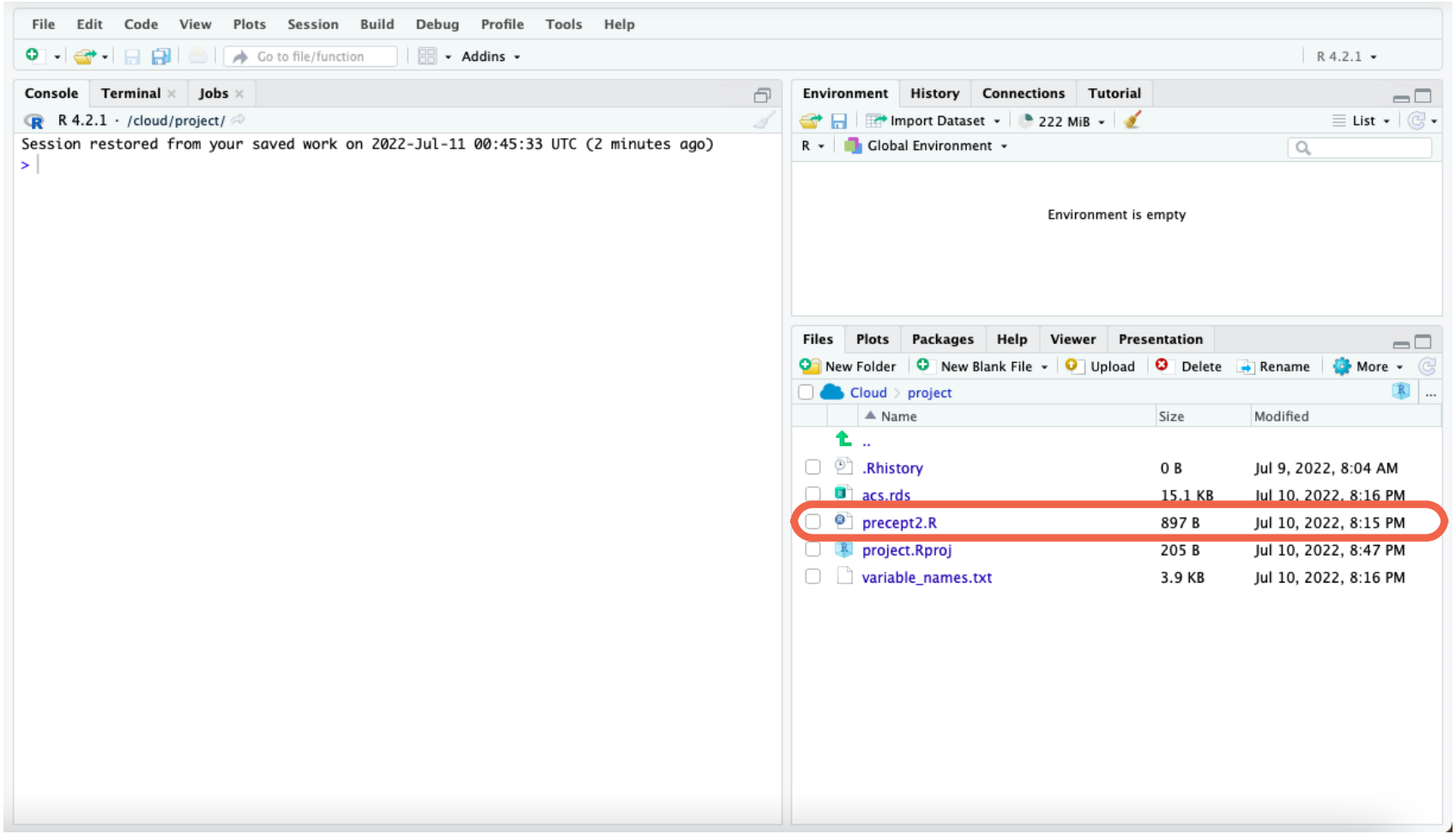
- What if we want to rerun this today?
- R scripts let us keep a record of the code, letting us save code.

R Script


File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function
Addins
R 4.2.1
Console Terminal Jobs
R 4.2.1 · /cloud/project/
Session restored from your saved work on 2022-Jul-11 00:45:33 UTC (2 minutes ago)
>
Environment History Connections Tutorial
Import Dataset
222 MiB
List
R
Global Environment
Environment is empty
Files Plots Packages Help Viewer Presentation
New Folder
New Blank File
Upload
Delete
Rename
More
Cloud
project
Name
Size
Modified
..
.Rhistory 0 B Jul 9, 2022, 8:04 AM
acs.rds 15.1 KB Jul 10, 2022, 8:16 PM
precept2.R 897 B Jul 10, 2022, 8:15 PM
project.Rproj 205 B Jul 10, 2022, 8:47 PM
variable_names.txt 3.9 KB Jul 10, 2022, 8:16 PM

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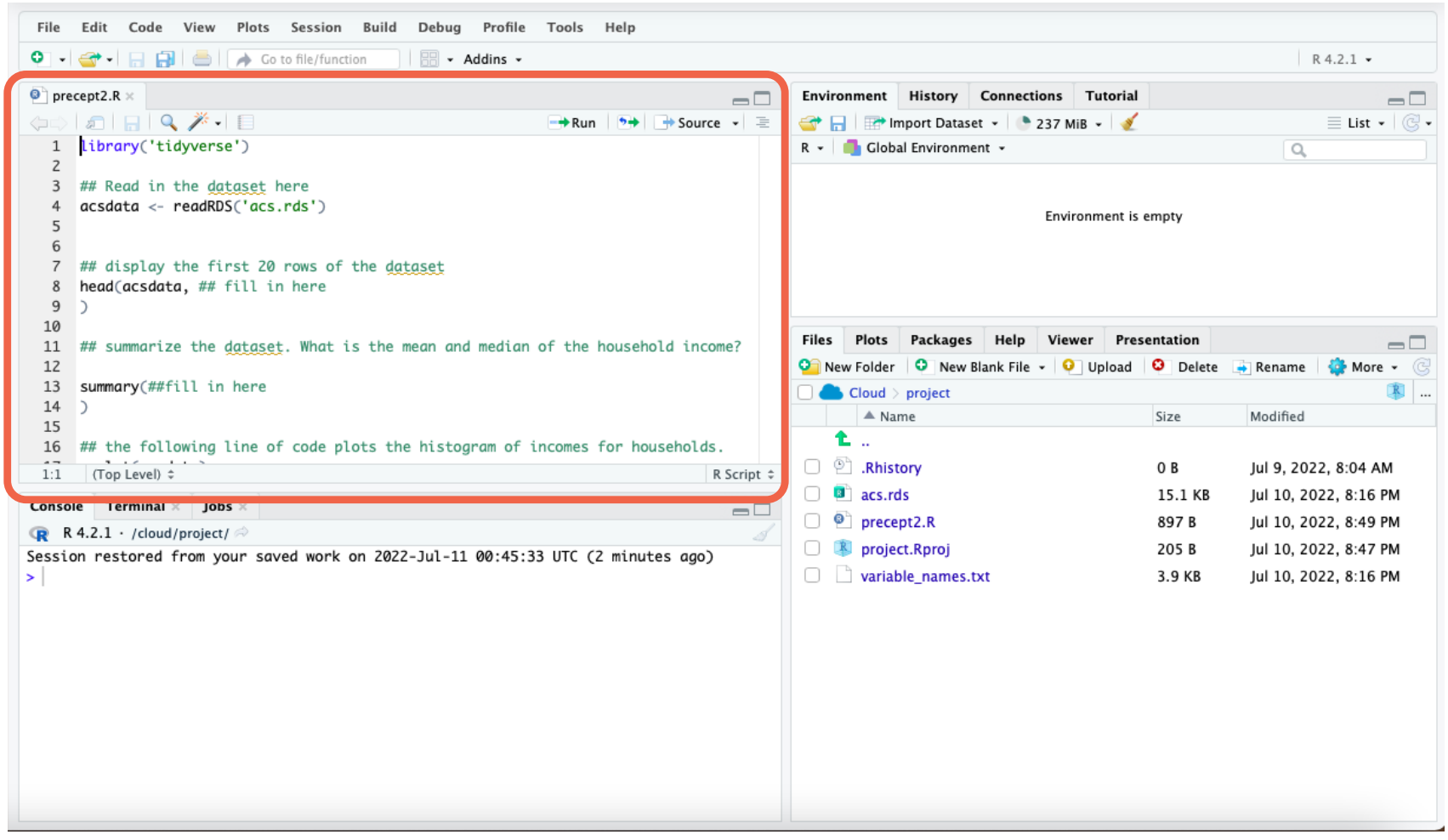
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precept2.R
Run
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7 ## display the first 20 rows of the dataset
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13 summary(##fill in here
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1:1
(Top Level)
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precept2.R

Run | Source

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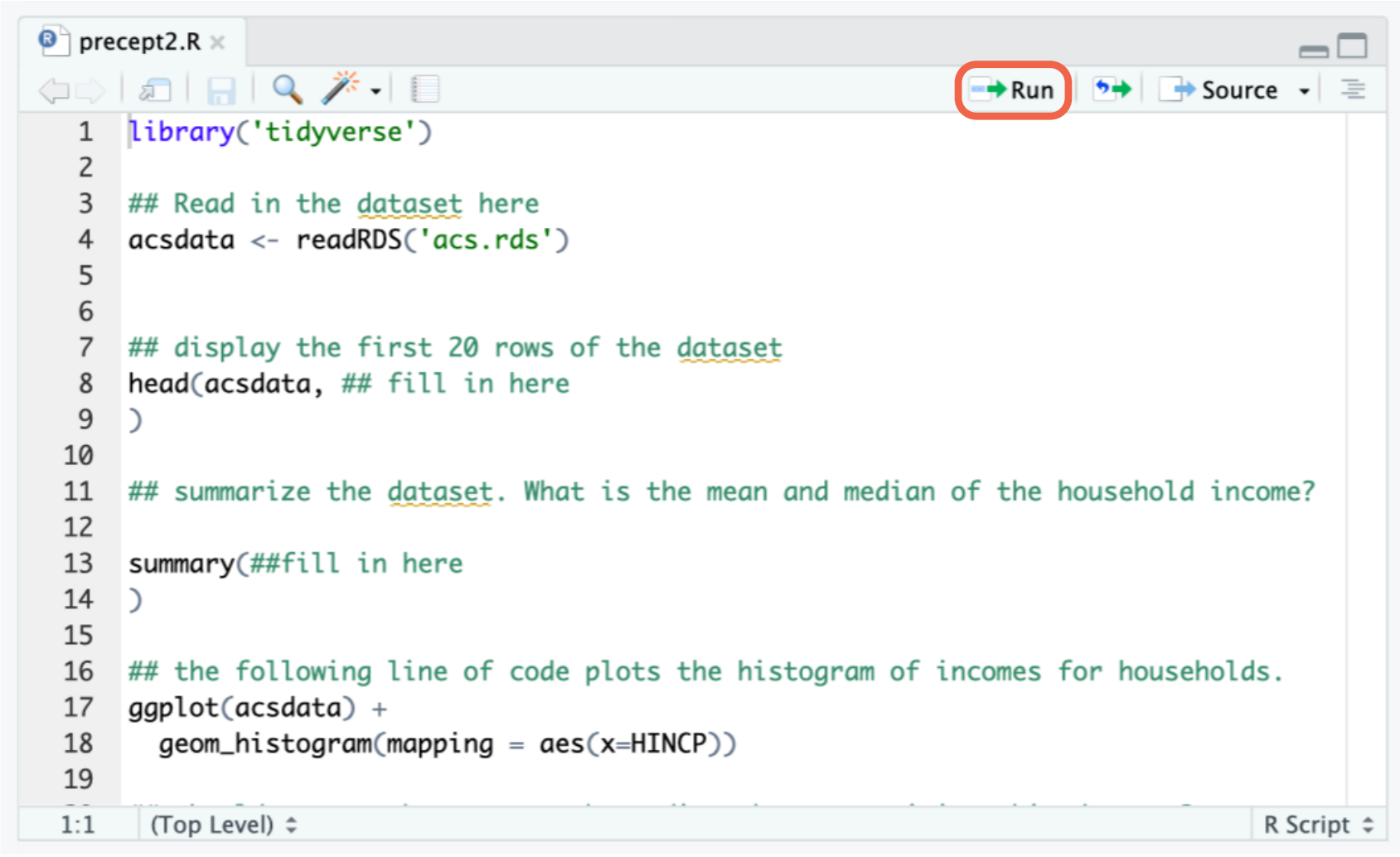
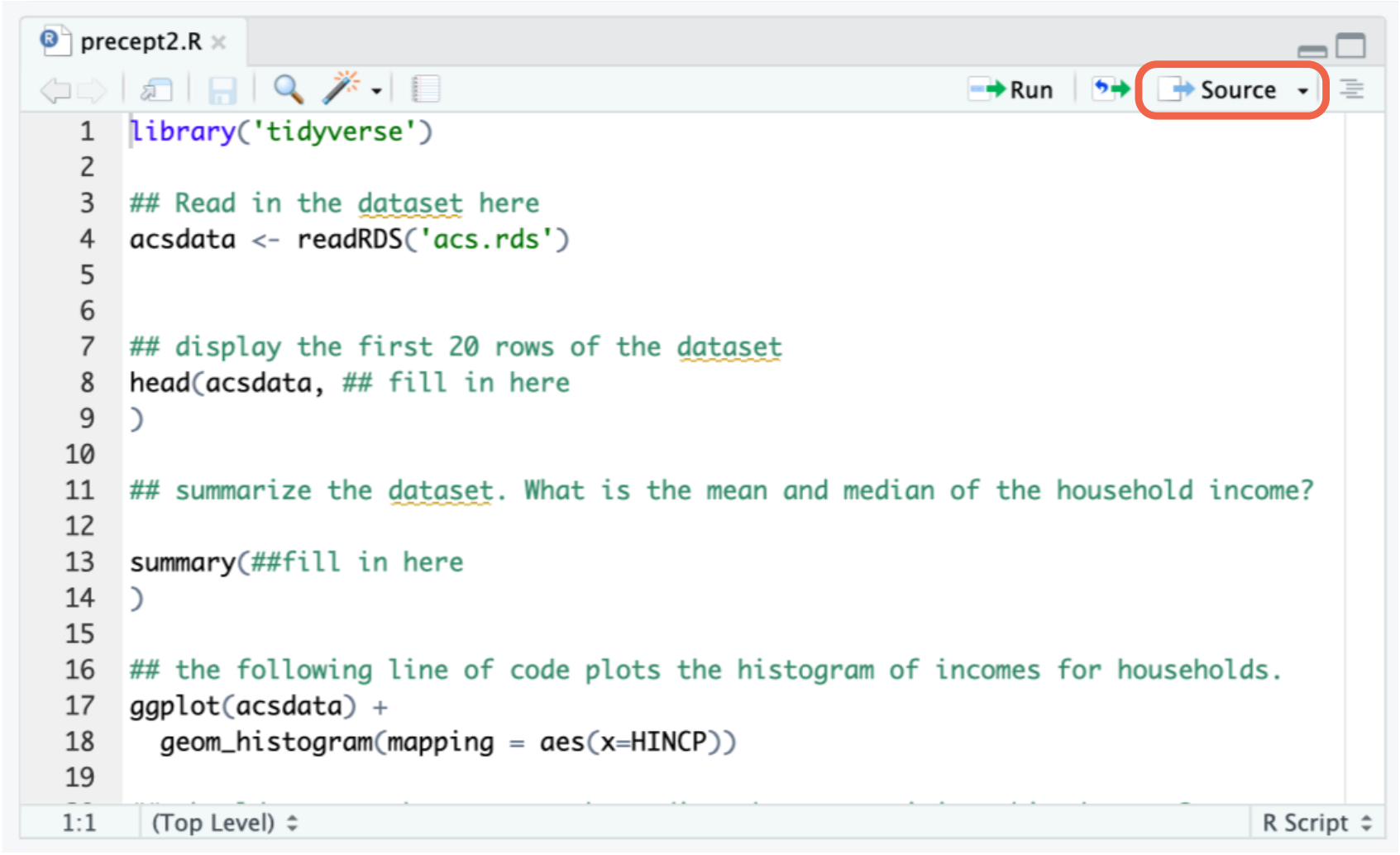


To run the line of code where the cursor is, click `Run` (or use `Cmd + Enter`)

R scripts



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For the first 2 assignments, you'll submit an R script along with any plots and a text file with answers.

Question for today

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(Mercer county is where we are right now!)

Data

- Working with the American Community Survey (ACS) dataset (`https://data.census.gov/mdat/#/`)
- Contains infomation about household incomes, race, gender, etc.
- We're using the 2019 data from just Mercer county.

Loading and Viewing a dataset

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You try!

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- In `precept2.R`, fill in the command to read and view the first few observations from the `acs` dataset
- Look up `?head`. Can you figure out how to change `head` to display the first 20 observations?

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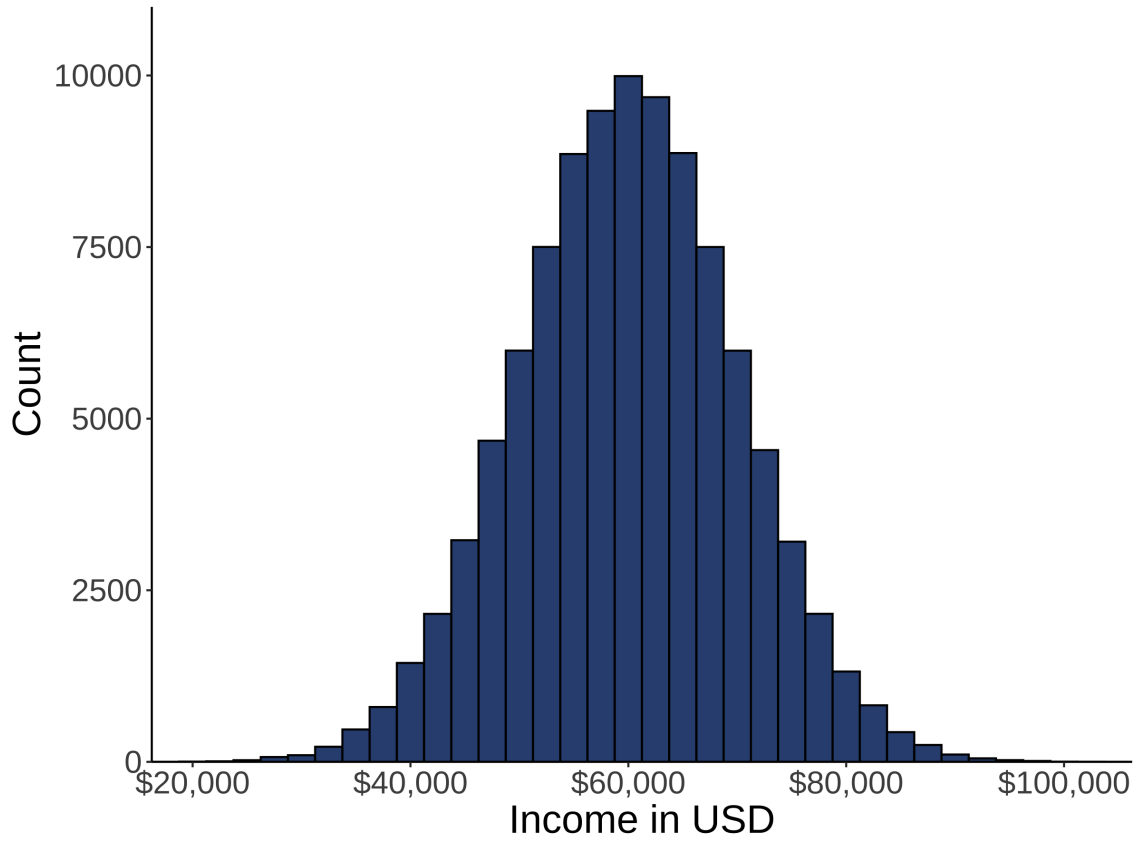
The mean and median are very different for this dataset. What do we expect the *distribution* to look like?

Recall: Frequency distributions



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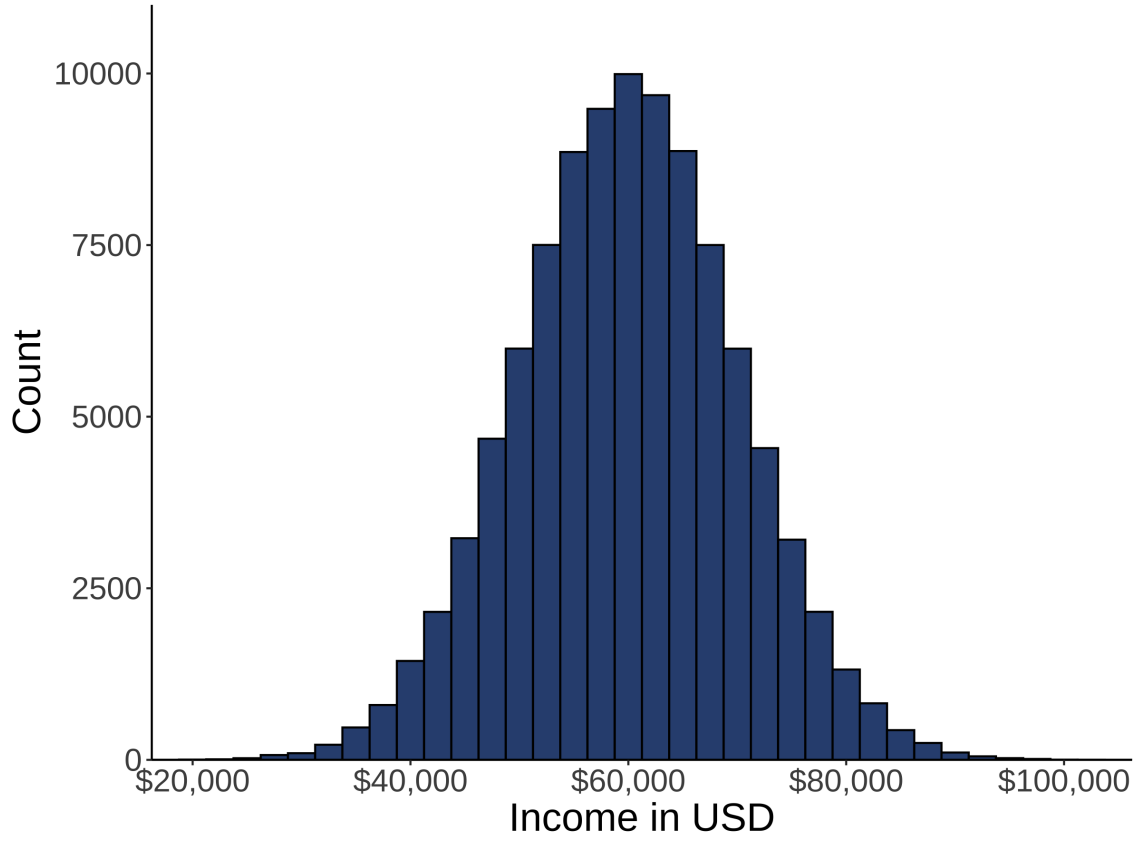
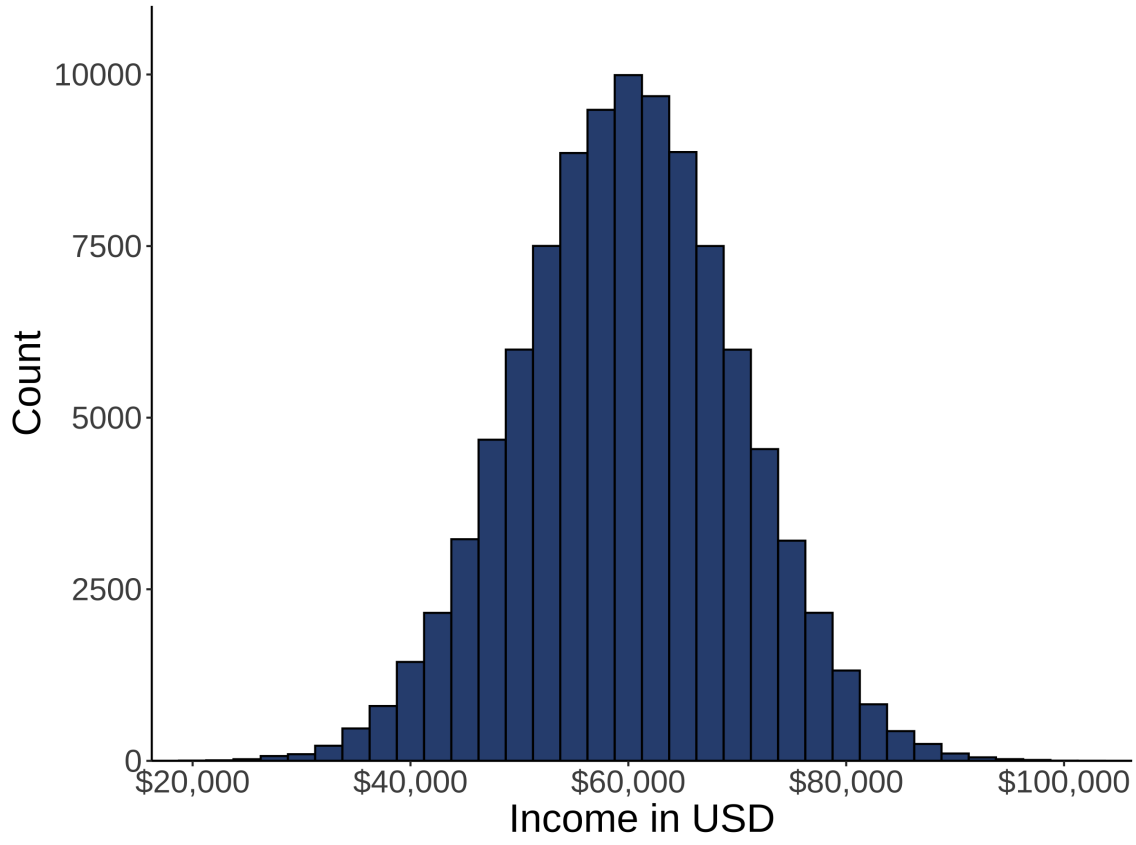


- Each bar covers a range of values $2,500 wide.
- Height of bar is number of people whose income falls in that range.

Recall: Frequency distributions



How can we plot this?

Introduction to `ggplot2`

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- **Load**: Tells the `R` compiler that you will be using functions from this package. Syntax: `library("tidyverse")`
  - Need to run this each time. Think of difference between installing a lightbulb and switching on a lightbulb.

Introduction to ggplot2

- Basic syntax for a histogram:

```
ggplot(data=acsdata) +
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- Note: the package name is ggplot2, but the command is (confusingly) ggplot

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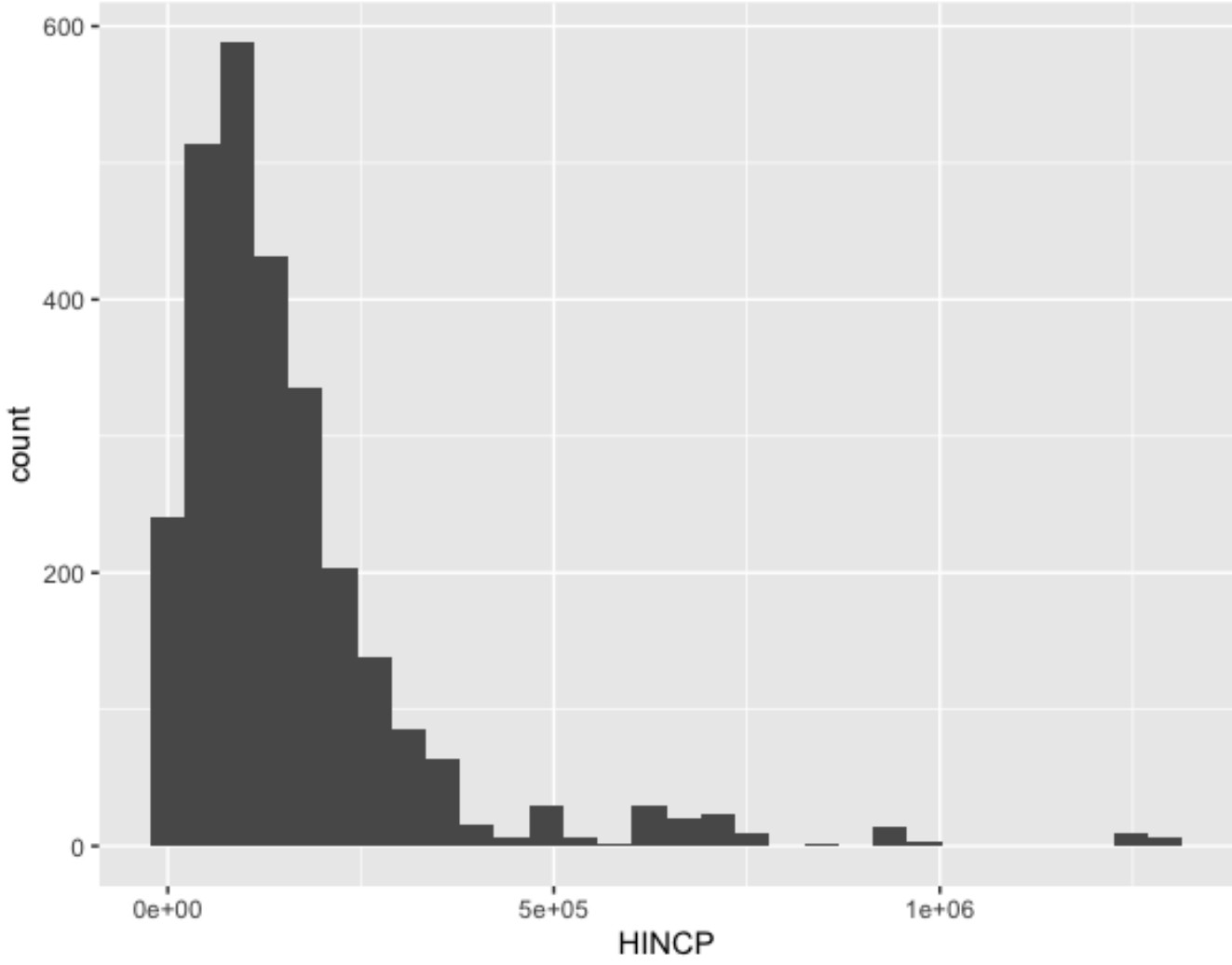
What does this output?

Introduction to ggplot2



You try!

Try summarizing the data and plotting a simple histogram.

Introduction to ggplot2

```
ggplot(data=acsdata) +
    geom_histogram(mapping = aes(x=HINCP))
```

Let's break this down.

- `ggplot()`: This creates an empty plot that we can add layers to.
- `ggplot(data=acsdata)`: says that we're going to be using this data for the rest of this plot, so we don't need to specify it again.

Introduction to ggplot2

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Let's break this down.

- `geom_histogram` adds a histogram to the plot.
  - lots of `geom` functions you can use! Common ones: `geom_point` (for a scatter plot), `geom_boxplot` (for a box plot), `geom_vline`, `geom_hline` (for vertical and horizontal lines), etc.

Introduction to ggplot2

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ggplot(data=acsdata) +
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Let's break this down.

- `mapping=aes(x=HINCP)` : what the graph is going to contain; i.e, the x-axis contains buckets with the household income.
- `mapping=aes()` maps the data to the plot. Try running the previous command, but with

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geom_histogram(mapping=aes(x=HINCP, color="blue"))
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- What if instead we run:

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Plotting a histogram: binwidths

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You might have seen this warning when plotting the histogram.

- A bin size that's too small looks very noisy
- However a bin size that's too large can hide important trends.

You try!

Try varying the bin size by adding `binwidth` to the parameters of `geom_histogram`. What's a good size to use?

ggplot2: Grammar of graphics

Designed to mimic human thought when creating graphics, breaking up a visualization. Plots consist of

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  - `facet`: Breaks up data into subsets.
  - `theme`: stylistic changes like font size.

Adding median values to a histogram

We can add additional lines to our plot using by adding layers to our graph. Suppose `med` is the median of the household incomes:

```
ggplot(data=acsdata) +
    geom_histogram(mapping = aes(x=HINCP)) +
    geom_vline(mapping = aes(xintercept=med))
```

You try!

Add a median line to your plot. How would you change the color of the line?

Changing axis labels

The current axis labels aren't that easy to understand.

Changing axis labels

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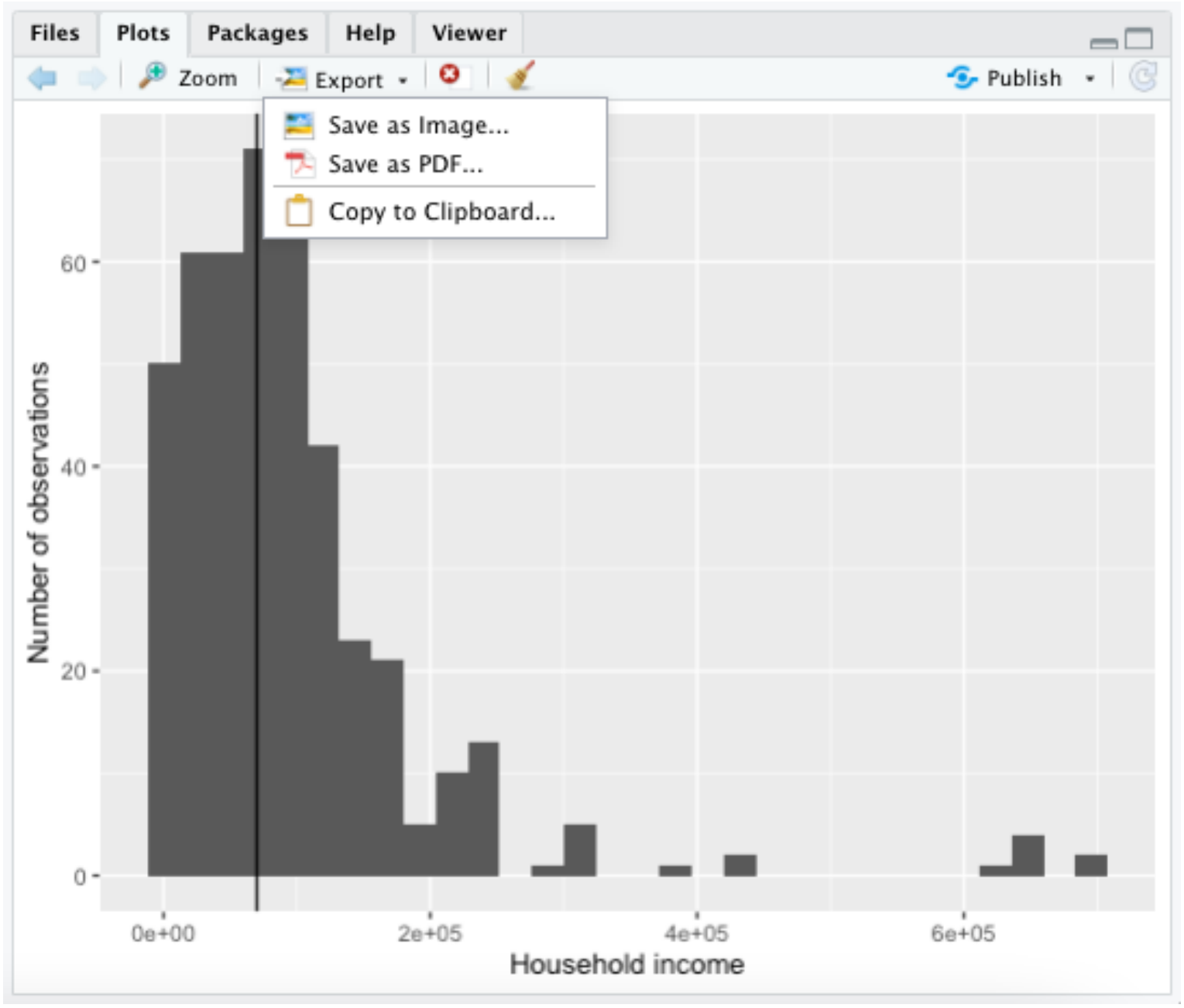
- We can add more layers to our plot to change these!

```
ggplot(data=acsdata) +
    geom_histogram(mapping = aes(x=HINCP)) +
    geom_vline(mapping = aes(xintercept=med)) +
    xlab("Household income") +
    ylab("Number of observations")
```

Saving a plot



- This is what the income of all the people from Mercer county look like.
- What if we wanted to plot the income of just Black people in Mercer county?

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- How about if you wanted to find all people who are atleast 25 years old?

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Note: `filter` is part of the '`dplyr`' package, which is one of the packages in `tidyverse`!

Putting it together

Make a histogram for household incomes of Black inviduals.
What's a good bin width to use?

What we did and what's next

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  - Summarizing data using `summary`
  - Plotting a histogram
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  - Counts and proportions

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- **Next precept**:
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- **Homework 1 will be available on Canvas today. Due on Thursday July 14th at 1:29 pm**
  - Goal for homework: You get to practice what you learned today with a different subset of the ACS dataset.