homework_4

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Read in the data as an R object named homicides.

```
homicides <- read.csv("C:/Users/Kayla/Desktop/r_course_2018/Homework_4/data/homicide-data.csv")

head(homicides)
```

```
##          uid reported_date victim_last victim_first victim_race victim_age
## 1 Alb-000001      20100504      GARCIA         JUAN    Hispanic         78
## 2 Alb-000002      20100216     MONTOYA      CAMERON    Hispanic         17
## 3 Alb-000003      20100601 SATTERFIELD      VIVIANA       White         15
## 4 Alb-000004      20100101    MENDIOLA       CARLOS    Hispanic         32
## 5 Alb-000005      20100102        MULA       VIVIAN       White         72
## 6 Alb-000006      20100126        BOOK    GERALDINE       White         91
##   victim_sex        city state      lat       lon           disposition
## 1       Male Albuquerque    NM 35.09579 -106.5386 Closed without arrest
## 2       Male Albuquerque    NM 35.05681 -106.7153      Closed by arrest
## 3     Female Albuquerque    NM 35.08609 -106.6956 Closed without arrest
## 4       Male Albuquerque    NM 35.07849 -106.5561      Closed by arrest
## 5     Female Albuquerque    NM 35.13036 -106.5810 Closed without arrest
## 6     Female Albuquerque    NM 35.15111 -106.5378        Open/No arrest
```

Create a new column called city_name that combines the city and state like this "Baltimore, MD".

```
homicides <- homicides %>%
    unite(city_name, city, state, sep = ", ", remove = FALSE)

head(homicides)
```

```
##          uid reported_date victim_last victim_first victim_race victim_age
## 1 Alb-000001      20100504      GARCIA         JUAN    Hispanic         78
## 2 Alb-000002      20100216     MONTOYA      CAMERON    Hispanic         17
## 3 Alb-000003      20100601 SATTERFIELD      VIVIANA       White         15
## 4 Alb-000004      20100101    MENDIOLA       CARLOS    Hispanic         32
## 5 Alb-000005      20100102        MULA       VIVIAN       White         72
## 6 Alb-000006      20100126        BOOK    GERALDINE       White         91
##   victim_sex       city_name        city state      lat       lon
## 1       Male Albuquerque, NM Albuquerque    NM 35.09579 -106.5386
## 2       Male Albuquerque, NM Albuquerque    NM 35.05681 -106.7153
## 3     Female Albuquerque, NM Albuquerque    NM 35.08609 -106.6956
## 4       Male Albuquerque, NM Albuquerque    NM 35.07849 -106.5561
## 5     Female Albuquerque, NM Albuquerque    NM 35.13036 -106.5810
## 6     Female Albuquerque, NM Albuquerque    NM 35.15111 -106.5378
##             disposition
## 1 Closed without arrest
## 2      Closed by arrest
## 3 Closed without arrest
## 4      Closed by arrest
## 5 Closed without arrest
## 6        Open/No arrest
```

Create a dataframe called unsolved with one row per city that gives the total number of homicides for the city and the number of unsolved homicides (those for which the disposition is "Closed without arrest" or "Open/No arrest").

```
homicides <- homicides %>%
  select(city_name, disposition) %>%
  mutate(unsolved_homicides = str_detect(disposition,
                                         c("Closed without arrest|Open/No arrest"))) %>%
  rename(total_homicides = disposition)

unsolved <- homicides %>%
  group_by(city_name) %>%
  summarise(total_homicides = sum(!is.na(total_homicides)),
            unsolved_homicides = sum((unsolved_homicides == "TRUE")))

head(unsolved)
```

```
## # A tibble: 6 x 3
##   city_name       total_homicides unsolved_homicides
##   <chr>                     <int>              <int>
## 1 Albuquerque, NM             378                146
## 2 Atlanta, GA                 973                373
## 3 Baltimore, MD              2827               1825
## 4 Baton Rouge, LA             424                196
## 5 Birmingham, AL              800                347
## 6 Boston, MA                  614                310
```

For the city of Baltimore, MD, use the prop.test function to estimate the proportion of homicides that are unsolved, as well as the 95% confidence interval for this proportion. Print the output of the prop.test directly in your RMarkdown, and then save the output of prop.test as an R object and apply the tidy function from the broom package to this object and pull the estimated proportion and confidence intervals from the resulting tidy dataframe.

```
homicide_prop <- unsolved %>%
  filter(city_name == "Baltimore, MD")

baltimore_homicides <- prop.test(x = homicide_prop$unsolved_homicides,
          n = homicide_prop$total_homicides)

tidy(baltimore_homicides)
```

```
## # A tibble: 1 x 8
##   estimate statistic  p.value parameter conf.low conf.high method
##      <dbl>     <dbl>    <dbl>     <int>    <dbl>     <dbl> <chr>
## 1    0.646      239. 6.46e-54         1    0.628     0.663 1-sam~
## # ... with 1 more variable: alternative <chr>
```

Now use what you learned from running prop.test for one city to run prop.test for all the cities. Your goal is to create the figure shown in homework directions, where the points show the estimated proportions of unsolved homicides in each city and the horizontal lines show the estimated 95% confidence intervals. Do this all within a "tidy" pipeline, starting from the unsolved dataframe that you created for step 3. Use map2 from purrr to apply prop.test within each city and then map from purrr to apply tidy to this output. Use the unnest function from the tidyr package on the resulting list-column (from mapping tidy to the prop.test output list-column), with the option .drop = TRUE, to get your estimates back into a regular tidy data frame before plotting.

```
all_homicides <- map2(unsolved$unsolved_homicides, unsolved$total_homicides, .f = prop.test)
```

```
## Warning in .f(.x[[i]], .y[[i]], ...): Chi-squared approximation may be
## incorrect
```

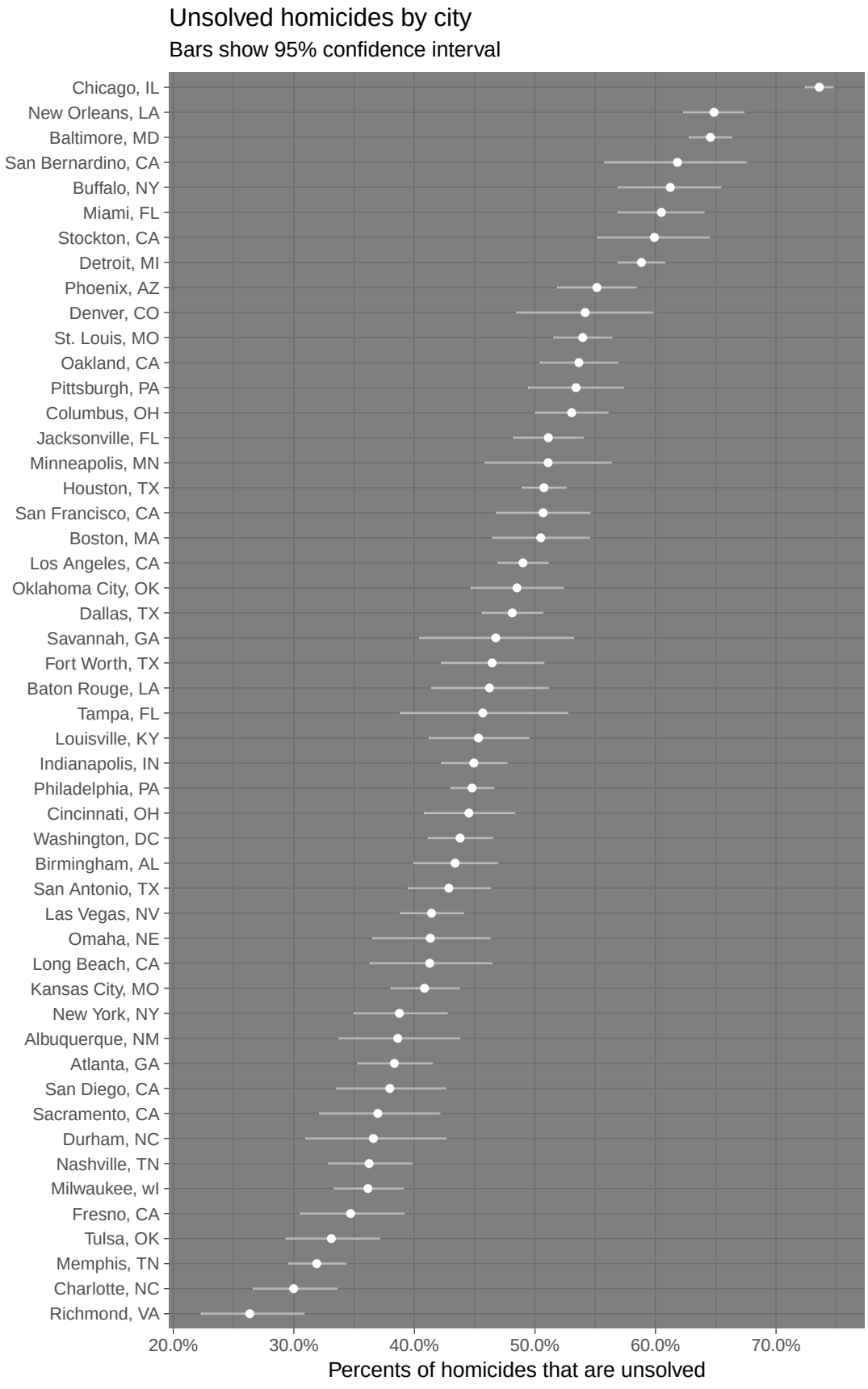
```
all_homicides2 <- map_df(all_homicides, tidy)

unnest(all_homicides2, .drop = TRUE)
```

```
## # A tibble: 51 x 8
##    estimate statistic   p.value parameter conf.low conf.high method
##       <dbl>     <dbl>     <dbl>     <int>    <dbl>     <dbl> <chr>
##  1    0.386   19.1    1.23e-  5         1    0.337     0.438 1-sam~
##  2    0.383   52.5    4.32e- 13         1    0.353     0.415 1-sam~
##  3    0.646  239.     6.46e- 54         1    0.628     0.663 1-sam~
##  4    0.462    2.27   1.32e-  1         1    0.414     0.511 1-sam~
##  5    0.434   13.8    2.05e-  4         1    0.399     0.469 1-sam~
##  6    0.505    0.0407 8.40e-  1         1    0.465     0.545 1-sam~
##  7    0.612   25.8    3.73e-  7         1    0.569     0.654 1-sam~
##  8    0.300  109.     1.41e- 25         1    0.266     0.336 1-sam~
##  9    0.736 1231.     1.28e-269         1    0.724     0.747 1-sam~
## 10    0.445    8.11   4.41e-  3         1    0.408     0.483 1-sam~
## # ... with 41 more rows, and 1 more variable: alternative <chr>
```

Create the plot shown below. Hint: Check out the geom_errorbarh geom with the height = 0 option to get the horizontal lines for the confidence intervals. All of the code for this should be in an RMarkdown document. Render this to a pdf and then push to your GitHub repository. Go on GitHub and make sure that everything made it online.

```
prop_df %>%
  mutate(city_name = fct_reorder(city_name, estimate)) %>%
  filter(city_name != "Tulsa, AL") %>%
  ggplot(aes(x = city_name, y = estimate)) +
  geom_point(color = "white") +
  geom_errorbar(aes(ymin = conf.low,
                    ymax = conf.high), width = 0,
                color = "white", alpha = 0.5) +
  coord_flip() +
  ggtitle("Unsolved homicides by city", "Bars show 95% confidence interval") +
  labs(x = "", y = "Percents of homicides that are unsolved") +
  scale_y_continuous(labels = percent) +
  theme_dark()
```


Unsolved homicides by city
Bars show 95% confidence interval
Chicago, IL
New Orleans, LA
Baltimore, MD
San Bernardino, CA
Buffalo, NY
Miami, FL
Stockton, CA
Detroit, MI
Phoenix, AZ
Denver, CO
St. Louis, MO
Oakland, CA
Pittsburgh, PA
Columbus, OH
Jacksonville, FL
Minneapolis, MN
Houston, TX
San Francisco, CA
Boston, MA
Los Angeles, CA
Oklahoma City, OK
Dallas, TX
Savannah, GA
Fort Worth, TX
Baton Rouge, LA
Tampa, FL
Louisville, KY
Indianapolis, IN
Philadelphia, PA
Cincinnati, OH
Washington, DC
Birmingham, AL
San Antonio, TX
Las Vegas, NV
Omaha, NE
Long Beach, CA
Kansas City, MO
New York, NY
Albuquerque, NM
Atlanta, GA
San Diego, CA
Sacramento, CA
Durham, NC
Nashville, TN
Milwaukee, wI
Fresno, CA
Tulsa, OK
Memphis, TN
Charlotte, NC
Richmond, VA
20.0%
30.0%
40.0%
50.0%
60.0%
70.0%
Percents of homicides that are unsolved