AE 06: Joining country populations with continents

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Goal

Our ultimate goal in this application exercise is to create a bar plot of total populations of continents, where the input data are:

1. Countries and populations
2. Countries and continents

```
library(tidyverse) # for data wrangling and visualization
library(scales)    # for pretty axis breaks
```

Data

Countries and populations

These data come from The World Bank and reflect population counts as of 2022.

```
population <- read_csv("data/world-pop-2022.csv")
```

Let's take a look at the data.

```
population
```

```
# A tibble: 217 x 3
   country              year population
   <chr>               <dbl>      <dbl>
 1 Afghanistan          2022    41129.
 2 Albania              2022     2778.
```

```
 3 Algeria              2022    44903.
 4 American Samoa       2022       44.3
 5 Andorra              2022       79.8
 6 Angola               2022    35589.
 7 Antigua and Barbuda  2022       93.8
 8 Argentina            2022    46235.
 9 Armenia              2022     2780.
10 Aruba                2022      106.
# i 207 more rows
```

Continents

These data come from Our World in Data.

```
continents <- read_csv("data/continents.csv")
```

Let's take a look at the data.

```
continents
```

```
# A tibble: 285 x 4
   entity                code      year continent
   <chr>                 <chr>    <dbl> <chr>
 1 Abkhazia              OWID_ABK  2015 Asia
 2 Afghanistan           AFG       2015 Asia
 3 Akrotiri and Dhekelia OWID_AKD  2015 Asia
 4 Aland Islands         ALA       2015 Europe
 5 Albania               ALB       2015 Europe
 6 Algeria               DZA       2015 Africa
 7 American Samoa        ASM       2015 Oceania
 8 Andorra               AND       2015 Europe
 9 Angola                AGO       2015 Africa
10 Anguilla              AIA       2015 North America
# i 275 more rows
```

Exercises

- **Think out loud:**
  - Which variable(s) will we use to join the `population` and `continents` data frames?

Comment: The country and entity variables.

  - We want to create a new data frame that keeps all rows and columns from `population` and brings in the corresponding information from `continents`. Which join function should we use?

Comment: We would use left_join for this.

- **Demo:** Join the two data frames and name assign the joined data frame to a new data frame `population_continents`.

```
population_continent <- population |>
  left_join(continents, by = join_by(country == entity))
```

- **Demo:** Take a look at the newly created `population_continent` data frame. There are some countries that were not in `continents`. First, identify which countries these are (they will have `NA` values for `continent`).

```
population_continent |>
  filter(is.na(continent))
```

```
# A tibble: 6 x 6
  country                  year.x population code  year.y continent
  <chr>                     <dbl>      <dbl> <chr>  <dbl> <chr>
1 Congo, Dem. Rep.           2022     99010. <NA>      NA <NA>
2 Congo, Rep.                2022      5970. <NA>      NA <NA>
3 Hong Kong SAR, China       2022      7346. <NA>      NA <NA>
4 Korea, Dem. People's Rep.  2022     26069. <NA>      NA <NA>
5 Korea, Rep.                2022     51628. <NA>      NA <NA>
6 Kyrgyz Republic            2022      6975. <NA>      NA <NA>
```

- **Demo:** All of these countries are actually in the `continents` data frame, but under different names. So, let's clean that data first by updating the country names in the `population` data frame in a way they will match the `continents` data frame, and then joining them, using a `case_when()` statement in `mutate()`. At the end, check that all countries now have continent information.

```
population_continent <- population |>
  mutate(country = case_when(
    country == "Congo, Dem. Rep." ~ "Democratic Republic of Congo",
    country == "Congo, Rep." ~ "Congo",
    country == "Hong Kong SAR, China" ~ "Hong Kong",
    country == "Korea, Dem. People's Rep." ~ "North Korea",
```

```
    country == "Korea, Rep." ~ "South Korea",
    country == "Kyrgyz Republic" ~ "Kyrgyzstan",
    .default = country
    )
    ) |>
  left_join(continents, by = join_by(country == entity))

population_continent |>
  filter(is.na(continent))
```

```
# A tibble: 0 x 6
# i 6 variables: country <chr>, year.x <dbl>, population <dbl>, code <chr>,
#   year.y <dbl>, continent <chr>
```

- **Think out loud:** Which continent do you think has the highest population? Which do you think has the second highest? The lowest?

Comment: I think that the highest is Asia, second will probably be Africa and the lowest, if it included in this data set, would be Antarctica or if not it would likely be Oceania.

- **Demo:** Create a new data frame called `population_summary` that contains a row for each continent and a column for the total population for that continent, in descending order of population. Note that the function for calculating totals in R is `sum()`.

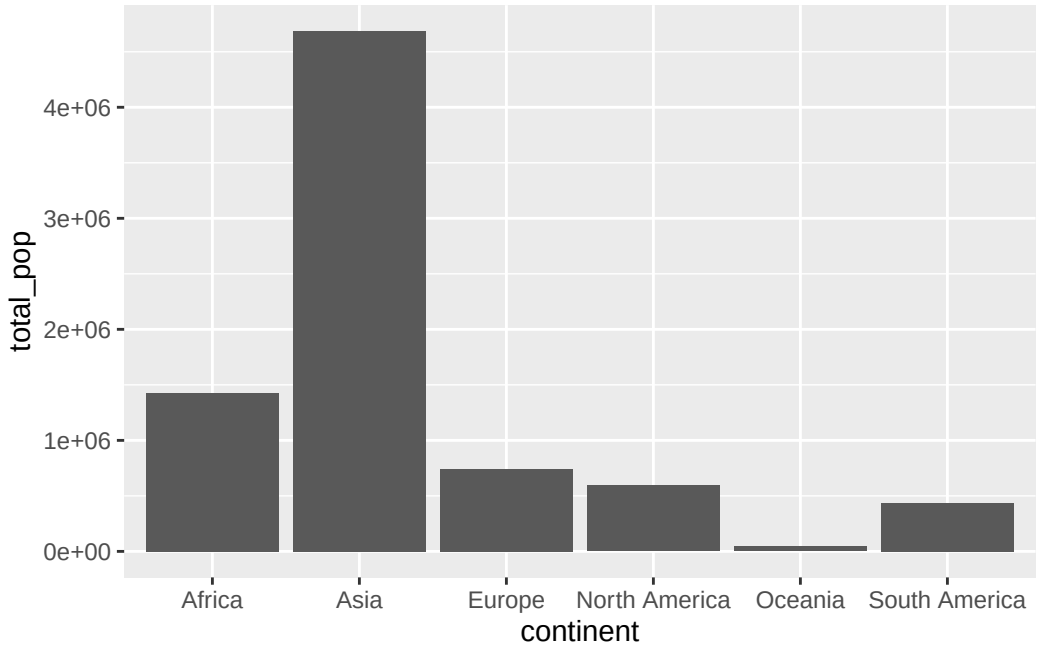
```
population_summary <- population_continent |>
  group_by(continent) |>
  summarize(total_pop = sum(population)) |>
  arrange (desc(total_pop))

population_summary
```

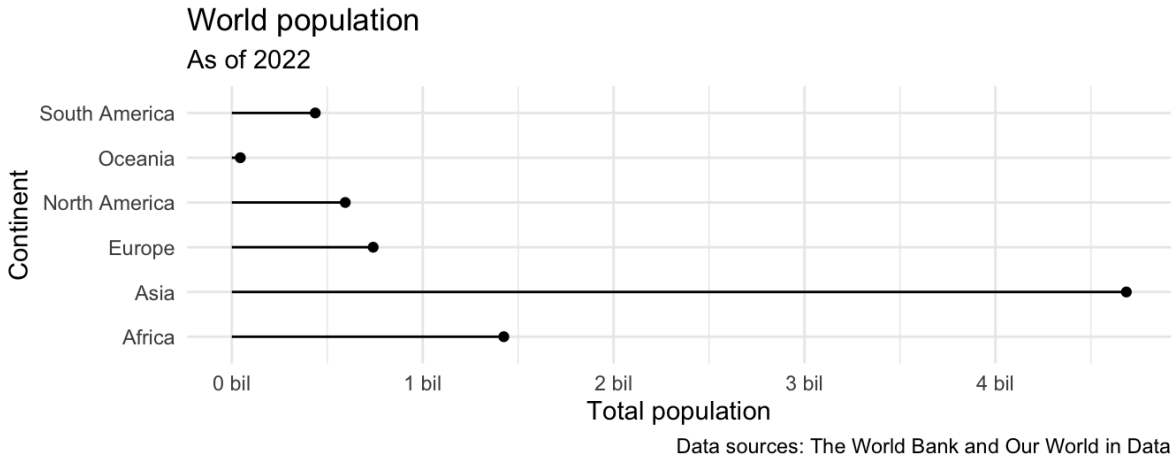
```
# A tibble: 6 x 2
  continent     total_pop
  <chr>             <dbl>
1 Asia           4685922.
2 Africa         1424831.
3 Europe          740607.
4 North America   594415.
5 South America   437233.
6 Oceania          44752.
```

- **Your turn:** Make a bar plot with total population on the y-axis and continent on the x-axis, where the height of each bar represents the total population in that continent.

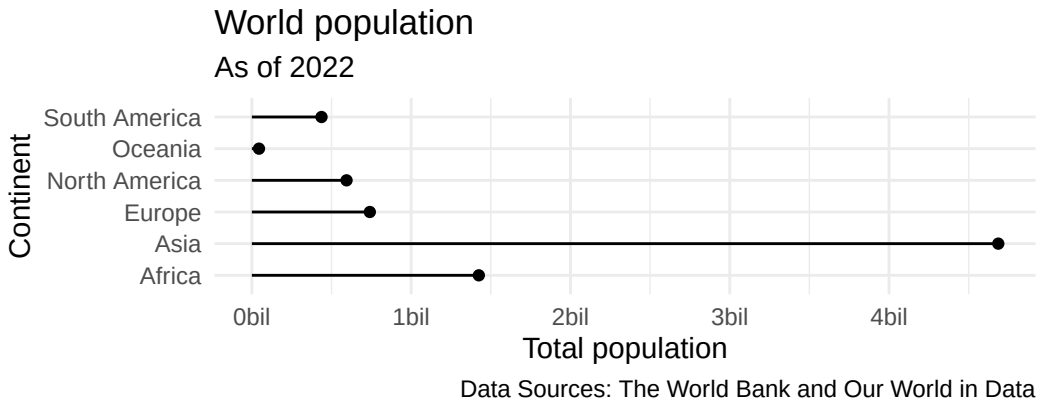
```r
ggplot(population_summary, aes (x = continent, y= total_pop)) +
  geom_col()
```



- **Your turn:** Recreate the following plot, which is commonly referred to as a **lollipop plot**. Hint: Start with the points, then try adding the `segment`s, then add axis labels and `caption`, and finally, as a stretch goal, update the x scale (which will require a function we haven't introduced in lectures or labs yet!).



```r
ggplot(population_summary, aes()) +
  geom_point(aes(x= total_pop, y = continent)) +
  geom_segment(aes(y= continent, x = 0, xend = total_pop)) +
  scale_x_continuous(labels = label_number(scale = 1/1000000, suffix = "bil")) +
  theme_minimal()+
  labs(
    x = "Total population",
    y = "Continent",
    title = "World population",
    subtitle = "As of 2022",
    caption = "Data Sources: The World Bank and Our World in Data"
  )
```



- **Think out loud:** What additional improvements would you like to make to this plot.

Comment: Orient the graph so that contients are on the x-axis, add some clearer labels, re order the continents in order of highest to lowest population.