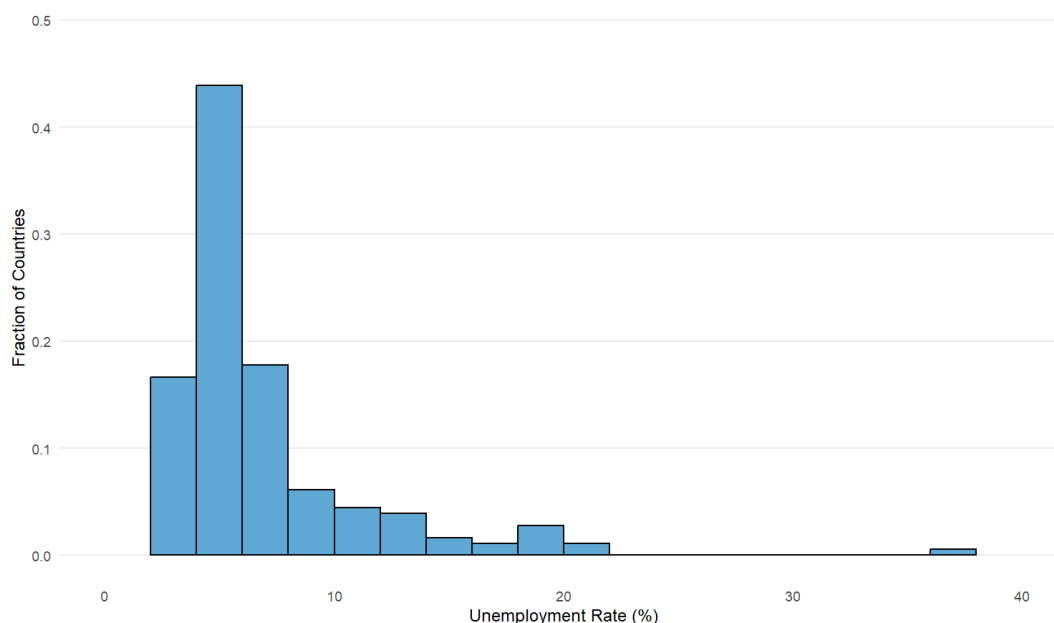


# Statistics with Recitation — Quiz 1

September 23, 2025

Name: \_\_\_\_\_ Student ID: \_\_\_\_\_

1. (6 points) The unemployment rate is defined as the percentage of the labor force that is unemployed and actively seeking work. This rate is often used as an indicator of economic conditions in a country. The relative frequency histogram below shows the distribution of unemployment rates across 180 countries in 2022.



- (a) (3 points) Estimate Q1, the median, and Q3 from the histogram.
- (b) (3 points) Would you expect the mean of this data set to be smaller or larger than the median? Explain your reasoning.

2. **(10 points)** A metropolitan transit agency wants to survey riders in a large city to understand satisfaction and priorities. The bus and rail network covers 24 districts with different demographics and route densities. For each part below, identify the sampling method described, and briefly discuss one statistical pro and one con in this city's context.
- (a) **(2 points)** Sample 400 riders selected at random from the list of all monthly pass holders.
  - (b) **(2 points)** Split the city into the 24 districts and randomly sample 25 riders *from each district*.
  - (c) **(2 points)** Randomly select 4 districts and survey *every rider* boarding at stops in those districts for one week.
  - (d) **(2 points)** Randomly select 6 districts, then within each selected district randomly sample 8 routes, then on each selected route randomly select 10 riders to survey.
  - (e) **(2 points)** Station surveyors at the 10 busiest downtown stops during rush hour and survey the first 40 riders who agree.

3. (**14 points**) In an educational psychology study on the effects of study environment on test performance, high school students were randomly assigned to three groups: (1) study in a quiet library, (2) study in a classroom with background music, or (3) study at home with no restrictions. After one week of preparation under these conditions, all students completed the same standardized math test. The average scores of the groups were compared, and the library group scored the highest.
- (a) (**2 points**) What type of study is this?
  - (b) (**3 points**) Identify the explanatory variable(s). What is the type of these variables?
  - (c) (**3 points**) Identify the response variable.
  - (d) (**3 points**) Comment on whether the results of this study can be generalized to all high school students, and why.
  - (e) (**3 points**) Comment on whether the results of the study can be used to establish causal relationships, and why.