

## Application exercise 5.3: Chi-square testing

Submit your responses on [Sakai](#), under the appropriate assignment. Only one submission per team is required. One team will be randomly selected and their responses will be discussed.

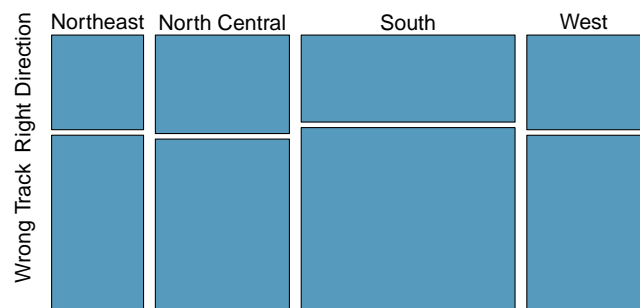
### American National Election Survey

The American National Election Studies (ANES) aims to inform explanations of election outcomes by providing data that support rich hypothesis testing, maximize methodological excellence, measure many variables, and promote comparisons across people, contexts, and time. In this question we will focus on two variables from the 2012 ANES dataset:

- region (levels: Northeast, North Central, South, and West), and
- whether the respondent feels things in this country are generally going in the right direction or things have pretty seriously gotten off on the wrong track.

To keep calculations simple we will work with a random sample of 500 respondents from the ANES dataset. The distribution of responses are as follows:

	Right Direction	Wrong Track	Total
Northeast	29	54	83
North Central	44	77	121
South	<b>62</b>	131	193
West	36	67	103
Total	171	329	500



**HINT: Read both parts before answering the question.**

#### 1. **Part 1:** Region

According to the 2010 Census, 18% of US residents live in the Northeast, 22% live in the North Central region, 37% live in the South, and 23% live in the North. Evaluate whether the ANES sample is representative of the population distribution of US residents. Make sure to clearly state the hypotheses, check conditions, calculate the appropriate test statistic and the p-value, and make your conclusion in context of the data. Also comment on what your conclusion says about whether or not this sample can be considered to be representative.

#### 2. **Part 2:** Region and direction

- In evaluating the relationship between region and feeling about the direction things are going in the country, what is the response variable and what is the explanatory variable?
- What are the hypotheses for evaluating this relationship?
- If in fact the null hypothesis is true, how many Southerners would we expect to respond that they feel things in this country are generally going in the right direction?
- What is the contribution of this cell (South & Right direction) to the test statistic?
- Speculate on whether you would expect to reject or not reject the null hypothesis based on the mosaic plot shown above. Explain your reasoning in at most two sentences.