

## 9.3: Steps in ANCOVA

First, we need to confirm that for at least one of the treatment groups there is a significant regression relationship with the covariate. Otherwise, including the covariate in the model won't improve the estimation of treatment means.

Then, we need to make sure that the regression relationship of the response with the covariate has the same slope for each treatment group. Graphically, this means that the regression line at each factor level has the same slope and therefore the lines are all parallel. Depending on the outcome of the test for equal slopes, we have two alternative ways to finish up the ANCOVA:

1. Fit a common slope model and adjust the treatment SS for the presence of the covariate
2. Evaluate the differences in means at least three levels of the covariate

These steps are illustrated in the following two sections and are diagrammed below:

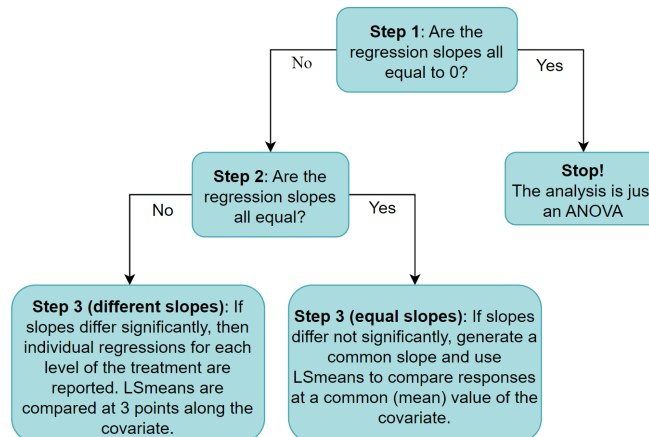


Figure 9.3.1: Flowchart for the ANCOVA

### Note

The figure above is presented as a guideline and does require some subjective judgment. Small sample sizes, for example, may result in none of the individual regressions in step 1 being statistically significant. Yet the inclusion of the covariate in the model may still be advantageous, as pooling the data will increase the number of observations when fitting the joint model. Exploratory data analysis and regression diagnostics also will be useful.

This page titled [9.3: Steps in ANCOVA](#) is shared under a [CC BY-NC 4.0](#) license and was authored, remixed, and/or curated by [Penn State's Department of Statistics](#) via [source content](#) that was edited to the style and standards of the LibreTexts platform.