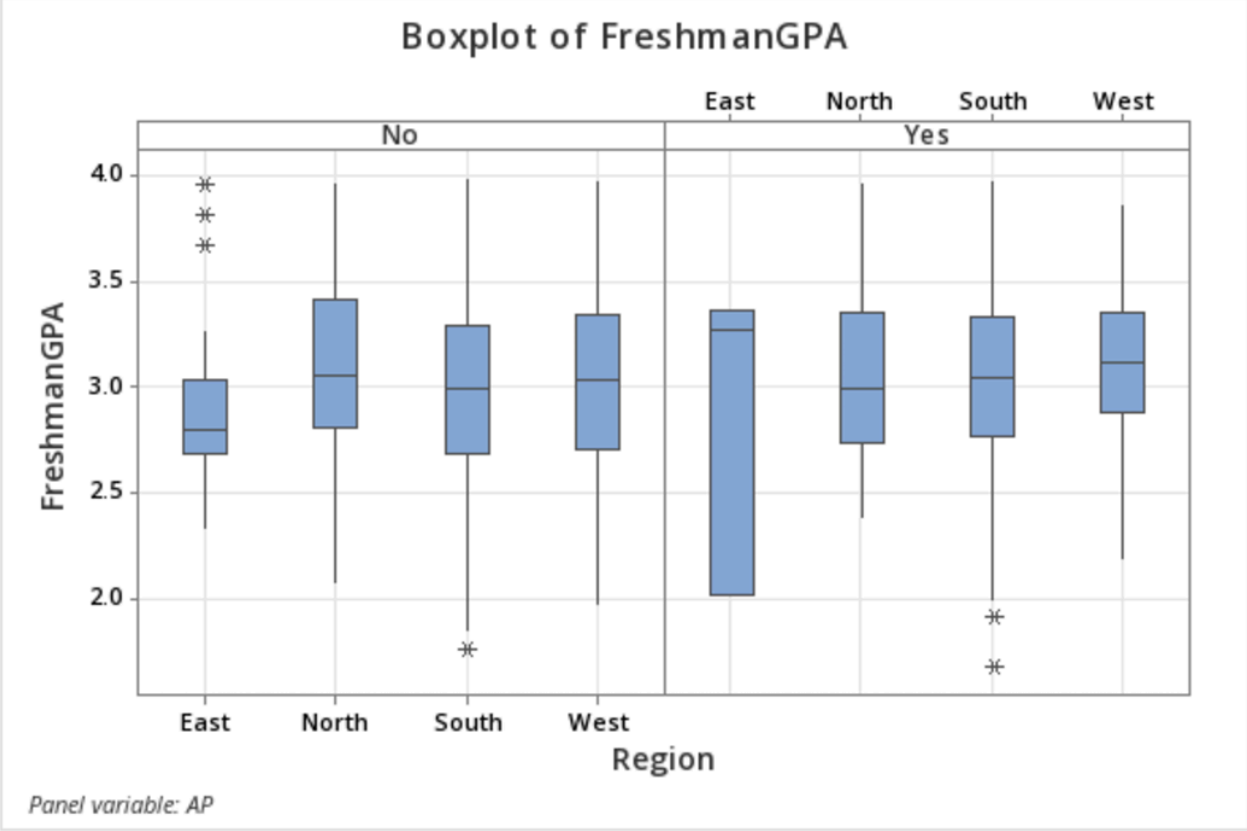
Nick Aurino

PR4

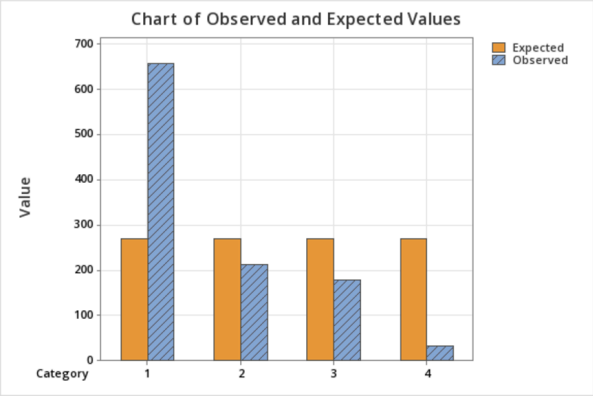
1)

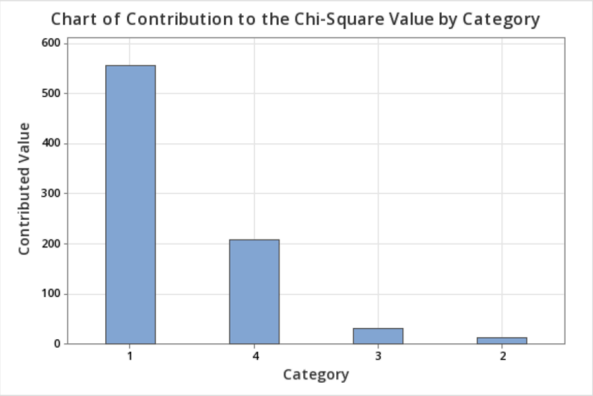


A two-way ANOVA test was used with FreshmanGPA as the dependent variable and Region and AP as the categorical factors. The null hypothesis stated that there are no significant differences in mean FreshmanGPA across levels of Region, levels of AP, or their interaction. The boxplot, shown above, summarizes the distribution of FreshmanGPA across regions and AP categories. The distributions are relatively symmetric for most groups, with a few outliers in the East (No) and South (No) groups. The data for the East (Yes) group is less variable compared to other groups, with a narrower interquartile range.

The results of the two-way ANOVA showed no statistically significant main effects for Region ($F = 1.05$, $p = 0.371$) or AP ($F = 0.11$, $p = 0.745$), and no significant interaction effect between Region and AP ($F = 0.39$, $p = 0.759$) at the 5% significance level. The R-squared value was 1.03%, showing that Region, AP, and their interaction explained very little of the variation in FreshmanGPA. These factors had a low impact, therefore we fail to reject the null hypothesis and conclude they do not significantly influence FreshmanGPA.

2)





Observed and Expected Counts

Category	Observed	Test Proportion	Expected	Contribution to Chi-Square
1	658	0.25	270	557.570
2	212	0.25	270	12.459
3	178	0.25	270	31.348
4	32	0.25	270	209.793

Chi-Square Test

N	DF	Chi-Sq	P-Value
1080	3	811.170	0.000

A chi-square goodness-of-fit test was conducted to determine whether the observed distribution of student outcomes, Chemistry Graduate, Leave University, Transfer then Graduate, and Transfer then Leave, differed a lot from an equal-proportion distribution, where 25% was expected for each category. The observed counts were 658 for Chemistry Graduate, 212 for Leave University, 178 for Transfer then Graduate, and 32 for Transfer then Leave, compared to an expected count of 270 for each category.

The results indicated a very high significant difference between the observed and expected distributions with a Chi-Square of 811.170, degrees of freedom of 3, and a p-value less than 0.001. The categories Chemistry Graduate (Category 1) and Transfer then Leave (Category 4) contributed the most to the chi-square value, as shown in the "Chart of Contribution to the Chi-Square Value by Category." This tells us that the actual distribution of outcomes is not uniform, with a much higher proportion of students graduating in chemistry and a smaller proportion transferring and leaving.