Portfolio Assignment 3 Example  
(95%)

This is an actual portfolio assignment from 2006, submitted by a second year student. First, the assignment is reproduced as it was submitted by the student. Next, it is reproduced with comments and changes to the text which are highlighted for you to compare with the original submission. I would have awarded a mark of 95% because it was a work of utter genius (see the end of this document for an explanation).

The Magnificent One-Way Independent ANOVA

Once upon a time in a kingdom far, far away there lived three beautiful daughters of a king. They loved each other very much and did everything together. However, in the castle lived also a witch, who was jealous of the three sisters’ friendship. One day she put a magic spell (experimental manipulation) over the sisters, she manipulated their beauty, and the sisters from now on would not stop arguing and fighting over who was the most beautiful. In constant competition, they could not remain friends as before.

The king despaired, not knowing how to resolve the situation. He therefore sent out an announcement that who ever could test if there was a significant difference in beauty between the girls would be generously rewarded in gold. The message reached the ambiguous T-Test, a prince from a neighbouring kingdom. However, when he attempted the task he almost instantly failed. His weakness was that he could not compare three sisters (means) at once, he could only compare two. The more he tried, the more mistakes the made (probability of Type 1 error increased). He soon had to give up.

One day an unknown knight come knocking on the castle door. He said his name was One-Way-Independent ANOVA, from the powerful family of ANOVA. His father was a magician called Sir Ronald Aylmer Fisher, who had the magical powers of statistics, evolutionary biology and genetics. His brothers were the Repeated-Measures ANOVA, called One-Way, Two-way and Three-Way, and his sister was called Mixed ANOVA. His uncle was the famous ANCOVA and his aunt was MANOVA. He explained that they all had a long history of solving similar disputes and that he should be given a chance to have a go. The king, who had never heard of his family before, first doubted his ability and asked him to prove it with two examples of his past success.

One-Way then told him of two scientists called Jakupi and Rickard (2004) who had performed an experiment to investigate the temporal characteristics of memory formation. They had used one day old chicks in a spatial task with single trail learning, with thirteen
different train-test intervals, ranging from 10 to 120 min. The time it took from initial point to goal point was measured. One-way independent ANOVA was then used to compare memory performance over the thirteen different time-intervals. It revealed significant results, hence the time between trial and test had a significant impact on retention time. This provided support for a stage-like, temporal process of formation of memories.

The second example One-Way gave was an experiment measuring effects of coffee on essay writing. Different participants were given either water, one or ten cups of coffee and were then asked to write an essay on a given topic within half an hour. The essays were then marked by independent judges. One-way independent ANOVA revealed a significant difference in performance, where worst mark was given to essays written in the ten-cup condition and best marks in the water-condition.

The king was impressed and allowed One-Way try his luck. One-Way first measured their overall beauty (total variability between scores) and then compared the amount of beauty created by the spell (variation due to manipulation) to the amount of beauty due to individual differences (variability due to error) which produced the magical F-ratio. He found that more variation was explained by the spell than by individual differences, hence there was a significant difference in beauty between the three sisters. Everyone was amazed by the accuracy and efficiency of One-Way Independent ANOVA and he was celebrated as a hero.

However, the sisters were still not happy and continued to argue with one another. They needed to know not only that there was a difference, but also who was the most beautiful. One-Way then presented his horse, Post Hoc, and with help of the T-test they conducted pairwise comparisons, but this time they controlled for possible mistakes (Type 1 error rate) by correcting the level of significance so it remained at .05. This was done by dividing Type 1 error rate with the number of comparisons, as the mighty magician Bonferroni had taught One-Way.

It now became clear that the youngest sister was the most beautiful and the long dispute was finally solved, the sisters stopped arguing and became friends again. As a price for his magnificent accomplishment One-Way was not only given gold but was also offered to marry the youngest sister. He accepted and they lived happy for ever after.

The end.

References:
The Magnificent One-Way Independent ANOVA

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Comment [AF1]: A really inventive way to explain what a t-test does and its limitations.
Comment [AF2]: Good background information on where ANOVA came from.
Comment [AF3]: Good mention of other tests in the ANOVA family.
Comment [AF4]: As requested a study is reported in which the test was used. It’s very clearly explained.
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Marking Criteria

Why would I award 95%? In short, it’s accurate, does exactly what I asked for in the assignment, and as an added bonus weaves the information together in an incredibly inventive and fun way. Although fun is not an essential part of the assignment, it’s clear that this student has embraced the opportunity to be creative in thinking about how to explain ANOVA. My only negative point is that technically you couldn’t do ANOVA to resolve the issue of which princess was most beautiful because you’d have only 1 person per group and therefore, there wouldn’t be any within-group variability! I would begrudgingly have docked 5% for this, but this is as close to perfect as I have seen in this assignment.