UDACITY

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# Analyze A/B Test Results

REVIEW

HISTORY

## Meets Specifications

## CONGRATULATIONS !!!!

### Code Quality

All code cells can be run without error.

Docstrings, comments, and variable names enable readability of the code.

**A faster way to simulate the 10000 trials**

- When possible, it is always more computationally efficient to use `numpy` built-in operations over explicit `for` loops. The short reason is that `numpy`-based operations attack a computational problem based on vectors by computing large chunks simultaneously.
- Additionally, using loops to simulate 10000 can take a considerable amount of time vs using `numpy` https://softwareengineering.stackexchange.com/questions/254475/how-do-i-move-away-from-the-for-loop-school-of-thought

```
new_converted_simulation = np.random.binomial(n_new, p_new,  10000)/n_new
old_converted_simulation = np.random.binomial(n_old, p_old,  10000)/n_old
p_diffs = new_converted_simulation - old_converted_simulation
```

- Essentially, we are applying the null proportion to the total size of each page using the binomial distribution. Each element, for example, in `np.random.binomial(n_new, p_new, 10000)` results in an array with values like `[17262, 17250, 17277...]`. This array is 10000 elements large
- When we divide it by `n_new`, Python broadcasts `n_new` for each element and we return a proportion for each element.
- This is essentially is simulating, 10000, the new page conversion rate.
- We do this again for the old page.
- The difference of the two will result in a simulated difference array of length 10000 between the new page and old page conversions.
- **Note** that this method does not require you to calculate the null values to get the p-value.

## Statistical Analyses

All results from different analyses are correctly interpreted.

For all numeric values, you should provide the correct results of the analysis.

**AWESOME**

Getting the stats calculations for both the simulation and z-test correct is difficult at this stage. Great work.

Conclusions should include not only statistical reasoning, but also practical reasoning for the situation.

- **Spot On!!!** Great intuition with the relationship between the different hypotheses statements.
- **Extra Credit** Knowing that Part iii is a two-tailed test and Part ii is a one-tail test, can you convert the p-values between each other?

**One-Tailed and Two-Tailed Results**
https://stats.idre.ucla.edu/other/mult-pkg/faq/pvalue-htm/

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