sendwithus A/B test cheat sheet

Marascuillo's Procedure

Identify the variant with the highest success rate

p represents the rate

This is a preparation step we have added so that we can avoid unnecessary computation. We know that if there is a winner, it's going to be the variant with the highest success rate.

$$p_A = \frac{35}{75} = 0.467 \quad p_B = \frac{55}{125} = 0.44 \quad p_C = \frac{75}{100} = 0.75$$

Variant C has the highest success rate.

Compare your best variant to every other variant

p represents the rate
n represents the total
Chi-crit is the critical value we calculated in the Chi-Square Test (5.9915)

For each comparison, compute a test statistic and a critical value. If at any point your test statistic is less than the corresponding critical value, it means that the difference between the two variants is not statistically significant.

In other words, there is no clear winner and you can stop comparing variants.

test statistic	critical value	result
$\lvert p_i - p_j \rvert$	$\sqrt{\text{Chi-crit}} \times \sqrt{\frac{p_i(1-p_i)}{n_i} + \frac{p_j(1-p_j)}{n_j}}$	
$\lvert p_C - p_A \rvert$ $= \lvert 0.75 - 0.467 \rvert$ $= 0.283$	$\sqrt{5.9915} \times \sqrt{\frac{0.75(0.25)}{100} + \frac{0.467(0.533)}{75}}$ $= 2.44775 \times \sqrt{0.001875 + 0.00033}$ $= 2.44775 \times 0.046957427 = 0.1149$	Is 0.28 > 0.11? Yes. This means Variant C and Variant A have a statistically significant difference.
$\lvert p_C - p_B \rvert$ $= \lvert 0.75 - 0.44 \rvert$ $= 0.31$	$\sqrt{5.9915} \times \sqrt{\frac{0.75(0.25)}{100} + \frac{0.44(0.54)}{125}}$ $= 2.44775 \times \sqrt{0.002275 + 0.0019}$ $= 2.44775 \times 0.06461 = 0.15815$	Is 0.31 > 0.158? Yes. This means Variant C and Variant B have a statistically significant difference.

Here, we found there is significant statistical evidence that Variant C is different than both Variant A and Variant B.

Since we know it is also the best performing variant, we can declare Variant C to be the "winner".
