2.2 Experiment Evaluation

You need to determine the optimal voucher discount amount to offer churned GO-PULSA users.

You have tested 2 variables in the past 7 days. One experiment tested different voucher amounts while the other experiment was testing the frequency of sending push notifications to our customers.

Experiment design

Participants were randomly assigned to the experimental group and control group. There are 4 types of voucher amounts tested (10K,15K,20K and 25K). The non-frequent reminder group received one push notification per day for 2 days, while the frequent reminder group received one push notification per day for 4 days.

Question

1. Design the hypothesis and give your suggestion to the manager for the optimal voucher and reminder scheme based on your analysis using proper method
2. By inspection, it appears that 25K discount draws high attention to the users, but is it statistically significant?

Campaign Performance Table

Campaign Performance Table			
Reminder Frequency	Voucher Discounts	Target Users	Redeemed Users
Non-Frequent	10K	3043	167
Frequent	10K	3141	204
Non-Frequent	15K	3219	204
Frequent	15K	2928	266
Non-Frequent	20K	2823	299
Frequent	20K	2668	322
Non-Frequent	25K	3076	378
Frequent	25K	2709	478
Control Group	-	3624	41

Campaign Performance

Voucher Discounts	10K	15K	20K	25K
Reminder Frequency				
Frequent	6.494747	9.084699	12.068966	17.644887
Non-Frequent	5.488005	6.337372	10.591569	12.288687

For Voucher Discounts = 25k, higher conversion is observed and for users with frequent reminder group; we will further check if it is statistically significant or not

Optimal Reminder Scheme

Reminder Frequency	Redeemed Users	Target Users	redeem/target%
Frequent	1270	11446	11.095579
Non-Frequent	1048	12161	8.617712

Frequent Reminder group has better rate; if this difference is statistically significant

H0: There is no statistically significant difference between different reminder schemes with respect to the conversion [p1 = p2]

H1: There is statistically significant difference between different reminder schemes with respect to the conversion [p1 > p2] [Frequent Reminder Scheme Redeem% > Non-Frequent Reminder Scheme Redeem%]

```
##Optimal Reminder Scheme

## H0: p1 = p2
## H1: p1 > p2 [Frequent Reminder Scheme Redeem% > Non-Frequent Reminder Scheme Redeem%]

significance = 0.05

sample_success_a, sample_size_a = (1270, 11446)
sample_success_b, sample_size_b = (1048, 12161)

successes = np.array([sample_success_a, sample_success_b])
samples = np.array([sample_size_a, sample_size_b])

stat, p_value = proportions_ztest(count=successes, nobs=samples,  alternative='larger')
# report
print('z_stat: %0.3f, p_value: %0.3f' % (stat, p_value))
if p_value > significance:
   print ("Fail to reject the null hypothesis - we have nothing else to say")
else:
   print ("Reject the null hypothesis - suggest the alternative hypothesis is true")
```

```
z_stat: 6.394, p_value: 0.000
Reject the null hypothesis - suggest the alternative hypothesis is true
```

p-value is smaller than the significance(0.05); reject the null hypothesis. The Frequent Reminder group has a better conversion rate.

Optimal Voucher Discount Scheme

Voucher Discounts	Redeemed Users	Target Users	redeem/target%
10K	371	6184	5.999353
15K	470	6147	7.646006
20K	621	5491	11.309415
25K	856	5785	14.796889

25K Voucher group has better rate; if this difference is statistically significant

To check the significant difference if the 25K voucher type brings more conversions than other voucher types.

H0: There is no statistically significant difference between variant groups with respect to the conversion [Voucher discount 25K Redeem% = Other Voucher discount groups Redeem%]

H1: There is statistically significant differences between variant groups with respect to to the conversion [Voucher discount 25K Redeem% > Other Voucher discount groups Redeem%]

```
##Optimal Voucher Discount

## H0: p1 = p2
## H1: p1 > p2 [Voucher discount 25K Redeem% > Other Voucher discount groups Redeem%]

significance = 0.05

sample_success_a, sample_size_a = (856, 5785)
sample_success_b, sample_size_b = (1462, 17822)

successes = np.array([sample_success_a, sample_success_b])
samples = np.array([sample_size_a, sample_size_b])

stat, p_value = proportions_ztest(count=successes, nobs=samples,  alternative='larger')
# report
print('z_stat: %0.3f, p_value: %0.3f' % (stat, p_value))
if p_value > significance:
   print ("Fail to reject the null hypothesis - we have nothing else to say")
else:
   print ("Reject the null hypothesis - suggest the alternative hypothesis is true")
```

```
z_stat: 14.643, p_value: 0.000
Reject the null hypothesis - suggest the alternative hypothesis is true
```

p-value is smaller than the significance(0.05); reject the null hypothesis. The 25K Voucher group has a better conversion rate.

25K Voucher group has better rate than 20K Voucher group; if this difference is statistically significant

To check the significant difference if the 25K voucher type brings more conversions than 20K voucher types.

H0: There is no statistically significant difference between variant groups with respect to the conversion [Voucher discount 25K Redeem% = 20K Voucher discount groups Redeem%]

H1: There is statistically significant differences between variant groups with respect to to the conversion [Voucher discount 25K Redeem% > 20KVoucher discount groups Redeem%]

```
##Optimal Voucher Discount

## H0: p1 = p2
## H1: p1 > p2 [Voucher discount 25K Redeem% > Voucher discount 20K Redeem%]

significance = 0.05

sample_success_a, sample_size_a = (856, 5785)
sample_success_b, sample_size_b = (621, 5491)

successes = np.array([sample_success_a, sample_success_b])
samples = np.array([sample_size_a, sample_size_b])

stat, p_value = proportions_ztest(count=successes, nobs=samples,  alternative='larger')
# report
print('z_stat: %0.3f, p_value: %0.3f' % (stat, p_value))
if p_value > significance:
   print ("Fail to reject the null hypothesis - we have nothing else to say")
else:
   print ("Reject the null hypothesis - suggest the alternative hypothesis is true")
```

```
z_stat: 5.486, p_value: 0.000
Reject the null hypothesis - suggest the alternative hypothesis is true
```

p-value is smaller than the significance(0.05); reject the null hypothesis. The 25K Voucher group has a better conversion rate.