Root
Insurance Co

## Overview:

For the next step of the interview process, we'd ask that you complete a work sample exercise. We've tried to keep the problem statement minimal so that it shouldn't take too much time.

In this work sample, you'll be given:

- A little background on an AB test that we ran
- Access to two CSVs from which you can pull data about the test
- Information about the rows and columns in those CSVs
- A list of questions to answer about the test

If the problem statement doesn't specify something, you can make any decision that you want. You may use any tool to analyze the data and any tool to present your findings. Do what you're comfortable with and what you think makes the most sense for the job.

Please **do not include your name or any personally identifiable information in your submission**. We anonymize work samples when we review them to reduce the chance of bias in the review process.

If you have any questions please send us an email.

## Background:

- Root has a referral program that allows customers to get paid for referring their friends to Root. It's a win for everybody because it's typically cheaper for us to pay existing customers to refer their friends than it is for us to advertise on Google, Facebook, or anywhere else.
- We allow our customers to refer other customers. We usually pay $25 to both the sender and receiver when the receiver gets a quote. To get a quote, the receiver must complete the Root test drive, which typically takes 2-4 weeks.
- We ran an AB test to try to increase referrals. ¾ of customers received a promotion after buying a policy that offered them more money per successfully referred quote ($50) for a limited 30-day window. To qualify for the promotion, the receiver has to create their account within the sender's 30-day window and then eventually go on to get a quote.
- ¼ received the promo immediately after buying a policy, ¼ received it after 2 days, and ¼ received the promo 7 days after buying a policy. The promo lasts 30 days regardless of when it begins. The other ¼ did not receive the promo.

## Data Walkthrough:

You are being given access to two CSVs to answer the questions below. All of this data was pulled on 5/08/2018 at 2:15 PM**.**

The table referrral_promo_participants contains information about what experience people got in the referral promo test. Each row is a user. There are three columns in this table:

- **user_id:** This can be joined to the promo_referrals table.
- **bucket:** This indicates which of four experiences the user got in this experiment.
- **bucket_timestamp:** This indicates when the user bought their policy and when the user was bucketed into the experiment. For example, if a user was bucketed into the “168hr” variant on 2018-05-08, their promotion would start on 2018-05-15 (7 days after bind) and end on 2018-06-13 (36 days after bind). For accounts created after that, they would go back to receiving $25 per referred quote like the control.

The table promo_referrals contains information about everyone who was ever referred by someone bucketed into the referral promo test. Keep in mind that customers can refer while they are in the Root Test Drive, before they buy a policy and before the test starts. Each row is a referred account (also called a receiver). Keep in mind, there can be multiple referrals attributed to the same sender_user_id! There are nine columns in this table:

- **sender_user_id:** This can be joined to the referrral_promo_participants table.
- **receiver_account:** Since a referral is defined by the receiver creating an account, this column will always be 1.
- **receiver_account_timestamp**
- **receiver_quote**: Equals 1 if the receiver qualifies for a Root insurance quote
- **receiver_quote_timestamp**
- **receiver_policy**: Equals 1 if the user purchased a policy
- **receiver_policy_timestamp**
- **sender_earned_amount_in_dollars:** How much the sender earned when the receiver completed their quote
- **receiver_earned_amount_in_dollars:** How much the receiver earned when the receiver completed their quote

***NOTE:** You may observe a few records in the promo_referrals table where the receiver has been quoted, but has not been paid or where sender_earned_amount_in_dollars and receiver_earned_amount_in_dollars do not match. These records have to do with fraud detection & complying with state limits about how much insurance referral programs can pay out. There are very few of these and can be handled any way you wish without significantly changing the analysis or conclusions.

## Questions:

1. **What is the fairest way to compare the four buckets?**
2. **In terms of generating referral activity (accounts, quotes, and policies) during the experiment, which variant of the test was most successful? Why do you think that is?**
3. **Consider the fact that we're paying more money per referred quote during the promo variants. How would you evaluate the tradeoff between more referral activity and more cost?**
4. **Suppose today is 5/08/2018 at 2:15 PM (when the data was pulled). Based on your answers to questions 1-3, what should we do right now? Do you think we should roll out one of the four variants to everyone? Are any of the variants ready to be shut off? Should we leave it on to keep collecting more data? Why?**
5. **What other tests do you think we should run to further investigate and optimize referral activity?**