1-1 Introduction to Bayesian Modeling - Homework

Distributions

Audit Scenario - Substantive Testing

You're an audit manager planning and enagement and you have last years *(2012)* transaction data. You want to pull a sample from the top 10% *(transamt)* for 2013, but you need to adjust the distribution to reflect an increase of 20% in prices.

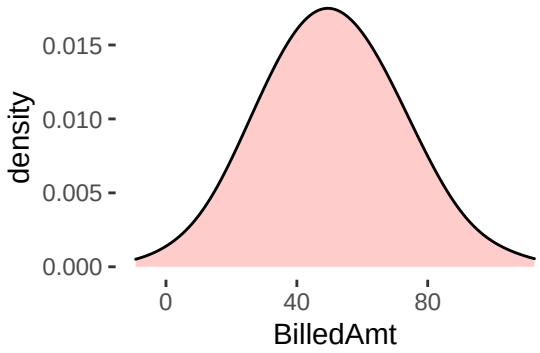
Note that 2013 transactions have not been completed yet - you're in planning.

Normally Distributed Transactions

Load the following libraries:

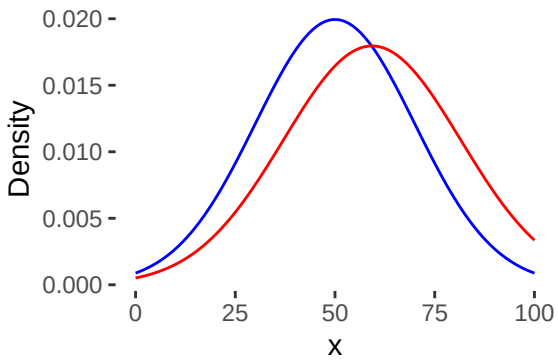
```
library(tidyverse)
library(lubridate)
library(rstan)
library(sn)
```

Read the b1012n.csv file, and create a visual of the distribution:



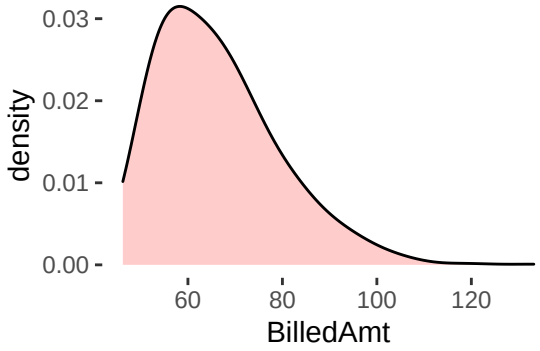
Now, Build a model that will create a posterior distibution that considers a high confidence in price increases.

1. Show the distibution of 2012 transactions, and the posterior distribution.
2. Determine the number of transactions that need to be sampled to include the top 10%.



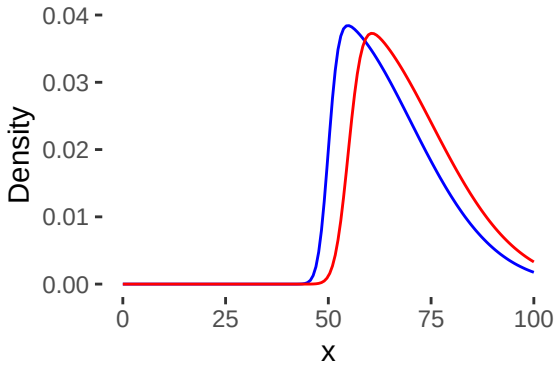
Skew Normal

Now, read the b1012sn.csv file, and create a visual of the distribution:



Assuming the same price increase as above:

1. Show the distibution of 2012 transactions, and the posterior distribution.
2. Determine the number of transactions that need to be sampled to include the top 10%.



Show your work.

(Note: just for reference, I got a cut of 75 with the normal, and a cut of 88 with the skew normal, for samplesizes of 106 and 203 respectively.)

Control Testing

Your substantive testing relies on your test of controls. Last year, out of 200 samples in the top 10%, 20 failed a test of controls. You take a small sample of transactions from H1 *(which has been completed)*, and you find that 12 out of 110 fail control tests.

Create a plot showing the prior, likelihood and posterior distributions *(shown below)* and compute the expected failure rate for each distribution: