Fitting volume frequency

```
library(lubridate)
```

```
##
## Attaching package: 'lubridate'
```

```
## The following object is masked from 'package:base':
##
##     date
```

```
library(tidyverse)
```

```
## ── Attaching packages ─────── tidyverse 1.2.1 ──
```

```
## ✓ ggplot2 3.1.0     ✓ purrr   0.2.5
## ✓ tibble  1.4.2     ✓ dplyr   0.7.7
## ✓ tidyr   0.8.2     ✓ stringr 1.3.1
## ✓ readr   1.1.1     ✓ forcats 0.3.0
```

```
## ── Conflicts ────────── tidyverse_conflicts() ──
## ✕ lubridate::as.difftime() masks base::as.difftime()
## ✕ lubridate::date()        masks base::date()
## ✕ dplyr::filter()          masks stats::filter()
## ✕ lubridate::intersect()   masks base::intersect()
## ✕ dplyr::lag()             masks stats::lag()
## ✕ lubridate::setdiff()     masks base::setdiff()
## ✕ lubridate::union()       masks base::union()
```

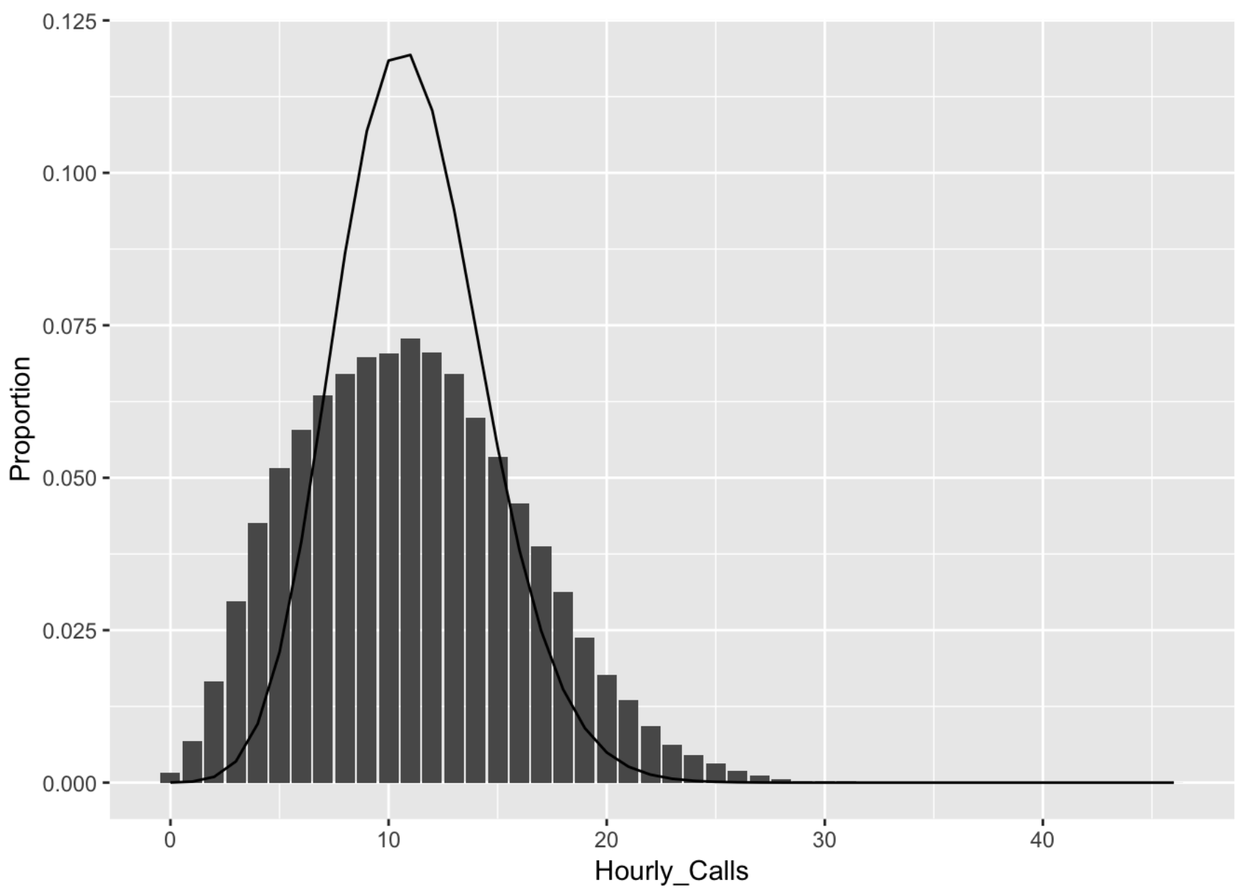
```
all_variables <- read_csv('all_vars.csv')
```

```
## Parsed with column specification:
## cols(
##   Date = col_datetime(format = ""),
##   n = col_integer(),
##   Year = col_integer(),
##   Hour = col_integer(),
##   Month = col_integer(),
##   yday = col_integer(),
##   wday = col_integer(),
##   pick = col_character(),
##   hr_index = col_integer(),
##   Temp = col_double(),
##   precip = col_logical(),
##   broncos = col_integer(),
##   rockies = col_integer(),
##   nuggets = col_integer()
## )
```

```
#Probability distribution of call volume----
all_variables %>%
  filter(n < 48) %>% #eliminates the 'bad data' from CAD downtime
  group_by(Hourly_Calls = n) %>%
  summarise(Occurrences = n()) %>%
  mutate(Proportion = Occurrences / sum(Occurrences)) %>%
  mutate(Mean = weighted.mean(.$Hourly_Calls, .$Occurrences)) -> vol_freq_table

# vol_freq_table %>% print(n=100)
```

Poisson

```
mn <- vol_freq_table %>% head(1) %>% pull(Mean)



vol_freq_table %>%
  mutate(Ei = dpois(x = Hourly_Calls, lambda = Mean)) %>%
  ggplot(aes(x = Hourly_Calls, y = Proportion)) +
  geom_col() +
  geom_line(aes(y = Ei)) # uh oh.
```



Negative Binomial

```
vol_freq_table %>%
  mutate(Ei = dnbinom(x = Hourly_Calls, size = Mean, prob = .43)) %>%
  ggplot(aes(x = Hourly_Calls, y = Proportion)) +
  geom_col() +
  geom_line(aes(y = Ei)) # uh oh.
```