lec3, Q1

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```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(binom)
```

1.

a.

1. There are n identical trails. This is satisfied, since each observation was recorded at the same town, same intersection, within one-half an hour time range.
2. There are 2 possible outcomes. This is satisfied, because the car is either alternative fuel using or not.
3. Each trail is independent to others. This condition is satisfied, because the type of one car does not affect the type of next car being observed.
4. The possibility of success remains constant through trails. This condition holds, because this is not likely to be affected by excluded measures.
5. The random variable of interest W is number of success. Satisfied, in this experiment , W=14.

b.

```
alpha <- 0.05
w <- 14
n <- 125
chop <- c("agresti-coull", "asymptotic", "wilson", "exact")
binom.confint(x = w, n = n, conf.level = 1-alpha, methods = "all") %>% filter(method %in% chop) -> CI1
print(CI1)
```

```
##          method  x   n  mean      lower     upper
## 1 agresti-coull 14 125 0.112 0.06674422 0.1803925
## 2    asymptotic 14 125 0.112 0.05671484 0.1672852
## 3         exact 14 125 0.112 0.06260138 0.1807736
## 4        wilson 14 125 0.112 0.06789839 0.1792384
```

c. Use 2-sided Score test H0: pi = 0.08 Ha: pi != 0.08

```
pi.0 = 0.08
prop.test(x=w, n=n, p = pi.0, alternative="two.sided", correct=FALSE) #2-sided Score test
```

```
##
##  1-sample proportions test without continuity correction
##
## data:  w out of n, null probability pi.0
## X-squared = 1.7391, df = 1, p-value = 0.1872
## alternative hypothesis: true p is not equal to 0.08
## 95 percent confidence interval:
##  0.06789839 0.17923836
## sample estimates:
##     p
## 0.112
```

We fail to reject H0, so we cannot conclude the probability in this intersection is differ from nationwide probability.