5240 Workshop 07

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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
```

Loading the results ...

```
results <- readRDS(file="5240-mean-reject-ws07.rds")
glimpse(results)
```

```
Rows: 10,000
Columns: 3
$ boot  <lgl> TRUE, TRUE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FAL~
$ clt   <lgl> TRUE, TRUE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FAL~
$ exact <lgl> TRUE, TRUE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FALSE, FAL~
```

Hypothesis

Ho (Null) : Proportions of simulation rejected using CLT based approach was 10% (p = 0.10).

Ha (Alternate) : Proportion of simulation rejected using CLT based approach was not equal to 10% (p != 0.10)

$\alpha = 0.05$

P value

Boot Method

```
boot_sum <- sum(results$boot)
boot_sum
```

```
[1] 1143
```

```
binom.test(boot_sum,10000, 0.10)
```

```
    Exact binomial test

data:  boot_sum and 10000
number of successes = 1143, number of trials = 10000, p-value =
3.03e-06
alternative hypothesis: true probability of success is not equal to 0.1
95 percent confidence interval:
 0.1081269 0.1206987
sample estimates:
probability of success
                0.1143
```

p value (boot method) : 3.03e-06

CLT Method

```
clt_sum <- sum(results$clt)
clt_sum
```

```
[1] 617
```

```
binom.test(clt_sum,10000,0.10)
```

```
    Exact binomial test

data:  clt_sum and 10000
number of successes = 617, number of trials = 10000, p-value < 2.2e-16
alternative hypothesis: true probability of success is not equal to 0.1
95 percent confidence interval:
 0.05706232 0.06659491
sample estimates:
probability of success
                0.0617
```

p value (clt method) : $< 2.2e\text{-}16$

Exact Method

```
exact_sum <- sum(results$exact)
exact_sum
```

```
[1] 1027
```

```
binom.test(exact_sum,10000,0.10)
```

```
    Exact binomial test

data:  exact_sum and 10000
number of successes = 1027, number of trials = 10000, p-value = 0.3681
alternative hypothesis: true probability of success is not equal to 0.1
95 percent confidence interval:
```

```
 0.09681653 0.10881597
sample estimates:
probability of success
                0.1027
```

p value (exact method) : 0.3681

Conclusion

For **clt based approach** , the p-value was less than 2.2e-16, which is extremely less than significance level 0.05, providing a strong evidence to reject the null hypothesis. Hence proportion of simulation rejected using clt based approach was different than 10%.

Similar result was observed for **boot method** (p-value(3.03e-06) < 0.05), rejecting null hypothesis, and making a conclusion that proportion of simulation rejected using boot based method was different from 10%.

p - value for **exact method** (p-value(0.3681) > 0.05), accepting null hypothesis, and making a conclusion that proportion of simulation rejected using boot based method was equal to 10%.