Lsn 16 - MA206Y

Clark

Midterm Return and Discussion

Course Project

5.2.2

Comparing 2 proportions - Theory based test

Null Hypothesis: The population proportion of boys born to smoking parents is the same as the population proportion of boys born to nonsmoking parents

Alternative Hypothesis: The population proportion of boys born to smoking parents is different from the population proportion of boys born to nonsmoking parents

$$H_0 :$$
$$H_a :$$

Our parameter of interest is:

One statistic we could use to estimate this paramter is:

Recall that we used the applet last class to examine the distribution of this statistic and we said if we squinted our eyes in sort of looked like a Normal Curve:

If our **validity conditions** are met, it turns out that we can use a standardized statistic:

And it has a Normal distribution. Recall that our standardized statistic gives us a feel for how many standard deviations our observation is from the mean.

From our smoking data we have:

So our z statistic is:

We can also find a Confidence Interval in a similar manner. Note that all the calculations can be done in R using `prop.test()`

```
prop.test(x = c(1975, 255), n = c(3602, 565), alternative = "two.sided", conf.level = 0.95,
    correct = F)
```

```
##
##  2-sample test for equality of proportions without continuity
##  correction
##
## data:  c(1975, 255) out of c(3602, 565)
## X-squared = 18.464, df = 1, p-value = 1.731e-05
## alternative hypothesis: two.sided
## 95 percent confidence interval:
##  0.05284535 0.14111278
## sample estimates:
##    prop 1    prop 2
## 0.5483065 0.4513274
```

Let's go piece by piece through this code and the output. Though it might look a bit intimidating, the thing to keep in mind is that the χ^2 value given is z^2 found above.

Let's work through 5.3.7