Example 4: Recently, a national airline claimed that 'at a minimum, 92% of our flights are on-time.' To test this claim, a statistician randomly selected 200 of this airline's flights, observing if each flight was 'on-time' or 'not'. 181 of the 200 flights arrived to their destination on-time. Conduct the appropriate test regulating the probability of committing a Type I error to be 5%, and base the decision on the P-value.

$\geq$

$H_0: p \geq 0.92$

$H_a: p < 0.92$

$p_0 = 0.92 \quad n = 200$

$\hat{p} = \frac{181}{200} = 0.905$

$$Z_{calc} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{\frac{181}{200} - 0.92}{\sqrt{\frac{0.92(1-0.92)}{200}}} \cong -0.7819290527.$$

p-value $\cong$ 0.2171280664

$\hookrightarrow > \alpha \Rightarrow$ FRH$_0$

If $p = 0.92$, prob of a sample prop ≤ 0.905 is 0.217 (quite likely)

we did Not see a sample that far from what we expected. Not much reason to question H$_0$! $\Rightarrow$ FRH$_0$.

Based on this sample [@ Sign. level of 5%] it appears prop. of flights on time is <u>Not</u> Sig less than 0.92

<u>Software Note</u> prop.test uses $\chi^2_{df=1}$ instead of $Z \sim N(0,1)$

So The test stat given $\chi^2_{df=1} = 0.61141 \Rightarrow \sqrt{0.61141} = |Z_{calc}|$

$\cong 0.7819291$

but p-value is still The same!