

ASSIGNMENT 7

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SUBJECT: MAT1011 L4

Registration no.: 19BCI7005

SLOT : L4

1. A popular cold-remedy was tested for its efficacy. In a sample of 150 people who took the remedy upon getting a cold, 117 (78%) had no symptoms one week later. In a sample of 125 people who took the placebo upon getting a cold, 90 (75%) had no symptoms one week later. The table summarizes this information.

```
x=c(117,90)
> n=c(150,120)
> prop.test(x,n,alternative="greater",correct=FALSE)

      2-sample test for equality of proportions without
      continuity correction

data:  x out of n
X-squared = 0.3354, df = 1, p-value = 0.2812
alternative hypothesis: greater
95 percent confidence interval:
 -0.05557192  1.00000000
sample estimates:
prop 1 prop 2
 0.78   0.75
```

We fail to reject the null hypothesis because P-value is greater than the significance level. Therefore we cannot support the claim.

2. The Trial Urban District Assessment (TUDA) is a study sponsored by the government of student achievement in large urban school district. In 2009, 1311 of a random sample of 1900 eighth-graders from Houston performed at or above the basic level in mathematics. In 2011, 1440 of a random sample of 2000 eighth-graders from Houston performed at or above the basic level. (The study reports the proportions). (A) Is there an increase in the proportion of eighth-graders who performed at or above the basic level in mathematics from 2009 to 2011 at the 5% significance level?

```

x=c(1440,1311)
> n=c(2000,1900)
> prop.test(x,n,alternative="greater",correct=FALSE)

      2-sample test for equality of proportions without
      continuity correction

data:  x out of n
X-squared = 4.2197, df = 1, p-value = 0.01998
alternative hypothesis: greater
95 percent confidence interval:
 0.005972807 1.000000000
sample estimates:
prop 1 prop 2
 0.72   0.69

```

The $p\text{-value}=0.01998 < 0.05$ and hence we reject the hypothesis that proportions of eighth grade students that performed at or above the basic level in mathematics in 2011 and 2009 respectively are the same.

(B) Compute the 95% confidence interval for the difference in proportion of eighth-graders who performed at or above the basic level in mathematics from 2009 to 2011

```

x=c(1440,1311)
> n=c(2000,1900)
> prop.test(x,n,correct=FALSE)

      2-sample test for equality of proportions without
      continuity correction

data:  x out of n
X-squared = 4.2197, df = 1, p-value = 0.03996
alternative hypothesis: two.sided
95 percent confidence interval:
 0.001369833 0.058630167
sample estimates:
prop 1 prop 2
 0.72   0.69

```

Thus we are 95% confident that the percent of eighth graders who performed at or above the basic level in mathematics in 2011 is between 0.14% and 5.68% higher than 2009.

3. The use of helmet among recreational alpine skiers and snowboarders are generally low. A study from Norway wanted to examine if helmet use reduces the risk of head injury. In the study, they compared the helmet use among skiers and snowboarders that was injured with a control group. The control group consisted of skiers and snowboarders that was uninjured. 96 of 578 people with head injuries used a helmet and 656 of 2992 people in the uninjured group used a helmet. Is helmet use lower among skiers and snowboarders who had head injuries?

```
x=c(96,656)
> n=c(578,2992)
> prop.test(x,n,alternative="less",correct=FALSE)

      2-sample test for equality of proportions without
      continuity correction

data:  x out of n
X-squared = 8.2336, df = 1, p-value = 0.002056
alternative hypothesis: less
95 percent confidence interval:
 -1.000000000 -0.02482216
sample estimates:
   prop 1    prop 2 
0.1660900 0.2192513
```

The $p\text{-value} = 0.0021 < 0.01$ so we have strong evidence that helmet use is lower among skiers and snowboarders who had head injuries compared to uninjured skiers and snowboarders