 # 2 SAMPLES: two proportions:

For $P_1 = \frac{x_1}{n_1}$ and $P_2 = \frac{x_2}{n_2}$

```
> #prop.test(x=c(x1,x2), n=c(n1,n2), alternative="", correct=F, conf.level=)
> # alternative: two.sided, less or greater.
```

Test retrieve X-squared; therefore, for Test Statistics Z, $z = \sqrt{X - Squared}$
Set continuity correction =FALSE since this is the textbook procedure.

Question 1:

```
> # Claim P1= P2     Ho: P1=P2  H1: P1 != P2
> prop.test(x=c(38,40), n=c(100,100),alternative ="two.sided", correct=F )

2-sample test for equality of proportions without continuity correction

data:  c(38, 40) out of c(100, 100)
X-squared = 0.084069, df = 1, p-value = 0.7719
alternative hypothesis: two.sided
95 percent confidence interval:
 -0.1551665  0.1151665
sample estimates:
prop 1 prop 2
  0.38   0.40
```

> #Test Stat $z = \sqrt{0.084069} = 0.29$ pvalue=0.7719 [since p1<p2, z=-0.29]
> # Pvalue > alpha (significance level); therefore, we fail to reject the Null Hypothesis. There is no sufficient evidence to warrant rejection of the claim that the two proportions are equal.

Question 2:

```
> #2
> # Claim P1 > P2    Ho: P1=P2    H1: P1>P2
> prop.test(x=c(38,23), n=c(85,90),alternative ="greater", correct=F )

2-sample test for equality of proportions without continuity correction

data:  c(38, 23) out of c(85, 90)
X-squared = 7.0602, df = 1, p-value = 0.003941
alternative hypothesis: greater
95 percent confidence interval:
 0.07493829 1.00000000
sample estimates:
   prop 1    prop 2
0.4470588 0.2555556
```

> #Test Stat $z = \sqrt{7.0602} = 2.66$ pvalue=0.0039
> # Pvalue < alpha (significance level); therefore, we reject the Null Hypothesis. There is sufficient evidence to support the claim that P1 is greater than P2.

Question 3:

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> #3
> # Claim P1 = P2      Ho: P1=P2    H1: P1!=P2
> # x1=193, n1=558     x2=196   n1=614
> prop.test(x=c(193,196), n=c(558,614), alternative="two.sided", correct=F)

2-sample test for equality of proportions without continuity correction

data:  c(193, 196) out of c(558, 614)
X-squared = 0.93699, df = 1, p-value = 0.3331
alternative hypothesis: two.sided
95 percent confidence interval:
 -0.02735117  0.08067096
sample estimates:
   prop 1    prop 2
0.3458781 0.3192182
```

> #Test Stat $z = \sqrt{0.93699} = 0.97$ pvalue=0.3331
> # Pvalue > alpha (significance level); therefore, we fail to reject the Null Hypothesis. There is not sufficient evidence to warrant rejection of the claim that P1 is equal to P2.

Question 4

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> #4

> # Claim  P1<P2     Ho: P1=P2    H1: P1 < P2
> prop.test(x=c(84,95), n=c(462,380), alternative="less", correct=F )

2-sample test for equality of proportions without continuity correction

data:  c(84, 95) out of c(462, 380)
X-squared = 5.7904, df = 1, p-value = 0.008057
alternative hypothesis: less
95 percent confidence interval:
 -1.0000000 -0.0212123
sample estimates:
   prop 1    prop 2
0.1818182 0.2500000
```

> #Test Stat $z = \sqrt{5.7904} = 2.41$ pvalue=0.008057 [since p1<p2, z=-2.41]
> # Pvalue < alpha (significance level=0.10); therefore, we reject the Null Hypothesis. There is sufficient evidence to support the claim that P1 is less than P2.

Question 5:

A 90% Confidence interval of the difference between two proportions:

```
>prop.test(x=c(19,25), n=c(46,57), alternative="two.sided", correct=F, conf.level=0.
90)

        2-sample test for equality of proportions without continuity correction

data:  c(19, 25) out of c(46, 57)
X-squared = 0.067928, df = 1, p-value = 0.7944
alternative hypothesis: two.sided
90 percent confidence interval:
 -0.186633  0.135527
sample estimates:
   prop 1    prop 2
0.4130435 0.4385965
```

Interpretation: The confidence interval allows to draw a conclusion about whether there is a difference between the two populations proportions. There are three cases:

a. Both sides of the Confidence interval are positives: It implies that P1 > P2.

b. Both sides of the Confidence interval are negatives: It implies that P1 < P2.

c. Left side is negative and right side is positive. It is said that the interval contains zero; that is, that the difference of proportions includes the value zero, which implies that there is no difference between the two population proportions.

In Question 5 the interval:

```
90 percent confidence interval:

 -0.186633  0.135527
```

```
>#Conclusions: The 90% interval   -0.186633 < p1-p2 < 0.124527   suggests that there
is no significant difference between the two populations proportions.
```