BT307 LAB 5

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1)

```
> x <- rnorm(50, mean = 10, sd = 2)
> t.test(x, conf.level = 0.95)$conf.int
[1]  9.321295 10.310568
attr(,"conf.level")
[1] 0.95
```

2)

```
> x <- c(15, 25)
> n <- c(50, 50)
> binom.test(x, n, conf.level = 0.95)$conf.int
[1] 0.2272627 0.5419852
attr(,"conf.level")
[1] 0.95
```

3)

```
One Sample t-test

data:  data
t = -0.96518, df = 9, p-value = 0.3597
alternative hypothesis: true mean is not equal to 15
95 percent confidence interval:
 11.32185 16.47815
sample estimates:
mean of x
     13.9
```

(a) Null hypothesis: The population mean is 15.
Alternate hypothesis: The population mean is not 15
(b) We fail to reject the null hypothesis.
(c) As p-value is 0.359 is greater than 0.05.

4)

```
Welch Two Sample t-test

data:  group1 and group2
t = -4.8587, df = 17.697, p-value = 0.0001321
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -12.036622  -4.763378
sample estimates:
```

```
mean of x mean of y
     13.9      22.3
```

(a) Null hypothesis: Means of group 1 and 2 are equal.
Alternate hypothesis: Means of group 1 and 2 are not equal.
(b) We reject the null hypothesis.
(c) P-value is less than 0.05.

5)

```
Paired t-test

data:  pre_treatment and post_treatment
t = -3, df = 9, p-value = 0.01496
alternative hypothesis: true mean difference is not equal to 0
95 percent confidence interval:
 -2.6310786 -0.3689214
sample estimates:
mean difference
           -1.5
```

(a) Null hypothesis: Means of pre-treatment and post-treatment measurements are equal.
Alternate hypothesis: Means of pre-treatment and post-treatment measurements are not equal.
(b) We reject the null hypothesis.
(c) P-value(0.0149) is less than 0.05.

6)

```
Pearson's Chi-squared test with Yates' continuity correction

data:  data
X-squared = 0.44643, df = 1, p-value = 0.504
```

(a) Null hypothesis: There is no association between the rows and columns.
Alternate hypothesis: There is an association between the rows and columns.
(b) We fail to reject the null hypothesis.
(c) As p-value is 0.504 is greater than 0.05.

7)

```
Df Sum Sq Mean Sq F value   Pr(>F)
group        2  67.73   33.87   15.88 0.000426 ***
Residuals   12  25.60    2.13
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

(a) Null hypothesis: There is no significant difference in means among the groups.
Alternative hypothesis: At least one group means is different from the others.

(b) We reject the null hypothesis.
(c) P-value(0.000426) is less than 0.05.

8)

```
Type I Error Rate: 0.0481
```

As type I error rate is less than 0.05, we can say that the error is controlled and the simulation is behaving as expected.