Name – Yash Daga Roll Number – 20BCE7323

T-test

Q.1) An outbreak of salmonella-related illness was attributed to ice produced at certain factory. Scientists measured the level of salmonella in 9 randomaly sampled batches ice cream. The levels (in MPN/g) were:
0.593
0.142
0.329
0.691
0.231
0.793
0.519
0.392
0.418
Is there evidence that the mean level of salmonella in ice cream greater than 0.3 MPN/g.
Ans > x = c(0.593, 0.142, 0.329, 0.691, 0.231, 0.793, 0.519, 0.392, 0.418)
> t.test(x, alternative="greater", mu=0.3)

One Sample t-test

data: x
t = 2.2051, df = 8, p-value = 0.02927
alternative hypothesis: true mean is greater than 0.3
95 percent confidence interval:
0.3245133 Inf
sample estimates:
mean of x
0.4564444

```
> x = c(0.593, 0.142, 0.329, 0.691, 0.231, 0.793, 0.519, 0.392, 0.418)
> t.test(x, alternative="greater", mu=0.3)

        One Sample t-test

data:  x
t = 2.2051, df = 8, p-value = 0.02927
alternative hypothesis: true mean is greater than 0.3
95 percent confidence interval:
 0.3245133       Inf
sample estimates:
mean of x
0.4564444

>
```

Q.2) Suppose that 10 volunteers have taken an intellegence test; here are the results obtained. The average score of the entire population is 75 in the entire test. Is there any signi_cant di_erence(with a signi_cance level of 95%) between the sample and population means, assuming that the variance of the population is not known.
Scores: 65, 78, 88, 55, 48, 95, 66, 57, 79, 81.
Ans > a = c(65, 78, 88, 55, 48, 95, 66, 57, 79, 81)
> t.test (a, mu=75)

One Sample t-test

data: a
t = -0.78303, df = 9, p-value = 0.4537
alternative hypothesis: true mean is not equal to 75
95 percent confidence interval:
60.22187 82.17813
sample estimates:
mean of x
71.2

```
> qt(0.975, 9)
[1] 2.262157
> a = c(65, 78, 88, 55, 48, 95, 66, 57, 79, 81)
> t.test (a, mu=75)

        One Sample t-test

data:  a
t = -0.78303, df = 9, p-value = 0.4537
alternative hypothesis: true mean is not equal to 75
95 percent confidence interval:
 60.22187 82.17813
sample estimates:
mean of x
     71.2

> qt(0.975, 9)
[1] 2.262157
>
```

Q.3) Comparing two independent sample means, taken from two population with unknown variance.
The following data shows the heights of the individuals of two di_erent countries with unknown population variances. Is there any signi_cant di_erence between the average heights of the two groups.
A: 175, 168, 168, 190, 156, 181, 182, 175, 174, 179
B: 185, 169, 173, 173, 188, 186, 175, 174, 179, 180

Ans

> a = c(175, 168, 168, 190, 156, 181, 182, 175, 174, 179)

> b = c(185, 169, 173, 173, 188, 186, 175, 174, 179, 180)

> t.test(a,b, var.equal=TRUE, paired=FALSE)

Two Sample t-test

data: a and b

t = -0.94737, df = 18, p-value = 0.356

alternative hypothesis: true difference in means is not equal to 0

95 percent confidence interval:

-10.93994 4.13994

sample estimates:

mean of x mean of y

174.8 178.2

> qt(0.975, 18)

[1] 2.100922

>

```
> a = c(175, 168, 168, 190, 156, 181, 182, 175, 174, 179)
> b = c(185, 169, 173, 173, 188, 186, 175, 174, 179, 180)
> t.test(a,b, var.equal=TRUE, paired=FALSE)

        Two Sample t-test

data:  a and b
t = -0.94737, df = 18, p-value = 0.356
alternative hypothesis: true difference in means is not equal to 0
95 percent confidence interval:
 -10.93994   4.13994
sample estimates:
mean of x mean of y
    174.8     178.2

> qt(0.975, 18)
[1] 2.100922
>
```