IT3030 Biostatistics Quiz#6 2019.05.28 ID:_____ Name:_____

In Lecture 14, slide#57 (FEV_1 example), we raised the null hypothesis (at α=0.1) that 3 group means are the same. We did the F-test and found a p-value smaller than 0.1 so we rejected the null hypothesis. Following this, we tested whether the difference could have existed between group 1 and 2.

(1) (20%) What is the result of this test? That is, is the mean FEV_1 from group 1 the same as the mean from group 2? Based on what you made this conclusion?

(2) (50%) Do the same thing to check if the mean from group 2 is the same as the mean from group 3, using the common S_w^2 previously obtained. Show your null hypothesis, level of significance used for the test, your t-value, the p-value, and your conclusion.

(3) (30%) Do the same thing in (2) by computing the specific S_p^2 from the two groups. Do you have the same conclusion?

Answer:

(1) In this test, we had p-value 0.0202 which is smaller than the prescribed α^*=0.1/3=0.033. So we rejected the null hypothesis that the two means are equal. That is, there exists significant difference between group 1 mean and group 2 mean.

(2) Null hypothesis **Ho: $\mu_2=\mu_3$, α^*=0.1/3=0.033**

```
>> x2=3.03;s2=0.523;n2=16;x3=2.88;s3=0.498;n3=23;
>> sw2=0.254; [Previously obtained]
>> t23=(x2-x3)/sqrt(sw2*(1/n2+1/n3))
t23 =      0.9143
```

The p-value I computed:

```
>> 2*(1-tcdf(t23,57)) [DF=57 because of Sw^2 was used]
ans =      0.3644
>>
```

This is greater than α^*=0.033. We therefore **don't reject** the null hypothesis. That is, the two means are **comparable**.

(3)

Computing the pooled estimated of the variance Sp^2 between the two (group 2 and group 3):

```
>> sp2=((n2-1)*s2^2+(n3-1)*s3^2)/(n2+n3-2)
sp2 =      0.2584
```

This is approximately the same as sw2=0.254 obtained from all 3 groups earlier.

```
>> t23=(x2-x3)/sqrt(sp2*(1/n2+1/n3))
t23 =      0.9065
```

p-value is:

```
>> 2*(1-tcdf(t23,n2+n3-2))
ans =
    0.3705
>>
```

The computed t-value and p-value are also comparable to the results using sw2. Therefore we did not change the conclusion that the two means are comparable.