

Hi! Here's some help with the two kinds of problems in the "Pairwise RH & Results" Pink thing for Unit 3

Expressing a RH via pairwise comparisons.

Those in Tx2 will perform better than those in Tx1 and Tx1 will perform better than those in Cx. Pick all that accurately convey this hypothesis.

- ☐ Tx2 less than Cx
- ☐ Tx1 greater than Cx
- ☐ Tx1 greater than Tx2
- ☐ Tx1 equal to Tx2
- ☐ Tx1 less than Tx2
- ☐ Tx1 equal to Cx
- ☐ Tx2 greater than Cx
- ☐ Tx2 equal to Cx
- ☐ Tx1 less than Cx

The **secret** to this is to FIRST take a moment and a piece of paper, and to translate the "**research design**" into the "**analysis design**", then sort out the parts of the RH: statement, THEN answer the pick the answers!

The **research design** for this problem is...

Tx2	Tx1	Cx

The **analysis design** for this problem (setting up the possible pairwise comparisons) is ...

Tx2 vs Tx1	Tx2 vs Cx	Tx1 vs Cx

Now we break down the RH: into pairwise comparisons. Sometimes the pairwise comparisons are explicit and sometimes they are **inferred**...

"Those in Tx2 will perform better than those in Tx1..." explicitly tells us that **Tx2 > Tx1**

"...Tx1 will perform better than those in Cx." Explicitly tells us that **Tx1 > Cx**

From these two we can **infer that** **Tx2 > Cx**

Different questions express the research hypothesis different ways and sometimes you have to infer the pattern of one of the pairwise comparisons from the other two.

## Testing a Research Hypothesis:

Subjects in Tx1 will do just as well as Tx2 and both will do better than Cx. With a  $mmd=3.6$ , what would you conclude from these results?

	mean	Cx	Tx1	Tx2
Cx	23.6			
Tx1	19.5	4.1		
Tx2	10.2	13.4	9.3	

- ☐ no support
- ☐ partial support, because Tx1 does just as well as Tx2 but Cx does better than both.
- ☐ partial support, because Tx1 does better than Tx2 but both do better than Cx.
- ☐ full support

So, this starts out like the other kind of problem, but then asks a bit more.

First, you have to express the RH: as a set of pairwise comparisons, then test those elements of the RH:, and finally decide if the RH: has “full support”, “partial support” or “no support”. Get some paper and don’t rush things!!

The **analysis design** for this problem (setting up the possible pairwise comparisons) is shown below. We fill that in from a careful breakdown of the RH:.

“Subjects in Tx1 will do just as well as Tx2” tells us **Tx2 = Tx1**

“Both will do better than Cx” tells us that tells us **Tx2 > Cx** and **Tx1 > Cx**

Pairwise comp →	Tx2 vs Tx1	Tx2 vs Cx	Tx1 vs Cx
<b>RH: →</b>	=	>	>

Next, get the pairwise mean differences in there – take your time on this part, most of the mistakes happen here

BE SURE TO CAPTURE THE **DIRECTION** OF THE PAIRWISE MEAN DIFFERENCE

- Tx2 vs Tx1 “< 9.3” means that Tx2 (mean = 10.2) is 9.3 less than Tx1 (mean = 19.5)
- Tx2 vs Cx “< 13.4” means that Tx2 (mean = 10.2) is 13.4 less than Cx (mean = 23.6)
- Tx1 vs Cx “< 4.1” means that Tx1 (mean = 19.5) is 4.1 less than Cx (mean 23.6)

Pairwise comp →	Tx2 vs Tx1	Tx2 vs Cx	Tx1 vs Cx
<b>RH: →</b>	=	>	>
<b>Pairwise mean difference</b>	< 9.3	< 13.4	< 4.1

Now we use the mmd value to decide if the pairwise comparisons are significant or not.

- If a pairwise mean difference is larger than the mmd, then that pairwise comparison is “significant” (and we will conclude that the group with the larger mean did significantly better than the other group)’
- If a pairwise mean difference is smaller than the mmd, then the pairwise comparison is “nonsignificant” (and we will conclude that the groups have equivalence means, even if one is numerically larger than the other)

According to the story, the mmd value for this analysis was → 3.6

Pairwise comp →	Tx2 vs Tx1	Tx2 vs Cx	Tx1 vs Cx
<b>RH: →</b>	=	>	>
<b>Pairwise mean difference</b>	< 9.3	< 13.4	< 4.1
<b>mmd decision</b>	<	<	<

Next, we decide if each pairwise RH: was supported or not:

Pairwise comp →	Tx2 vs Tx1	Tx2 vs Cx	Tx1 vs Cx
<b>RH: →</b>	=	>	>
<b>Pairwise mean difference</b>	< 9.3	< 13.4	< 4.1
<b>mmd decision</b>	<	<	<
<b>RH: support?</b>	NO! RH: was a null & we found an effect!	NO! RH: was TX2 would do better, but Cx did better!	NO! RH: was TX1 would do better, but Cx did better!

We would conclude that there was “No Support” for this Research Hypothesis.

Remember to:

- Notice when RH: is the H0: (if so, rejecting H0: doesn’t support the RH:) !!
- Notice the direction of a significant mean difference and double-check that it is hypothesized direction!!

REMEMBER, if you don’t like your score on the exercise, hit it again until you do!