Anthony Le

ST 511 (Tu 16:00-16:50)

15 November 2016

Homework 7

Question 1:

Note: my linear combinations are different due to how I constructed my data frame in are. R alphabetized the order of groups when calculating half-widths. Thus, here is my new group indices below:

|  |  |  |
| --- | --- | --- |
| Old Index (i and j) | New Index (i and j) | Locality |
| 6 | 1 | Angskar |
| 2 | 2 | In-Fredeln |
| 3 | 3 | Inre Hamnskar |
| 5 | 4 | Karringboskar |
| 4 | 5 | Norrpada |
| 7 | 6 | Svenska Hagarna |
| 1 | 7 | Uppsala |

Please refer to the new index for all of Question 1.

* + 1. Tukey-Kramer
    2. Schelffe
    3. Bonferroni (k=21)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Half-Widths of 95% CI for all 21 Pairwise Differences | | | | | | |
| i | j | pt est | SE(pt est) | Tukey-Kramer | Scheffe | Bonferroni |
| 1 | 2 | 6.12 | 2.390618 | 7.111202 | 8.562567 | 7.344466 |
| 1 | 3 | 4.67 | 2.922845 | 8.694379 | 10.468864 | 8.979575 |
| 1 | 4 | 0.61 | 4.614946 | 13.727754 | 16.529528 | 14.178056 |
| 1 | 5 | -0.34 | 2.677581 | 7.964809 | 9.590392 | 8.226073 |
| 1 | 6 | -3.10 | 2.129961 | 6.335845 | 7.628963 | 6.543675 |
| 1 | 7 | 8.86 | 2.866353 | 8.526336 | 10.266524 | 8.806020 |
| 2 | 3 | -1.45 | 3.302707 | 9.824328 | 11.829430 | 10.146588 |
| 2 | 4 | -5.51 | 4.864420 | 14.469845 | 17.423076 | 14.944489 |
| 2 | 5 | -6.46 | 3.087764 | 9.184954 | 11.059562 | 9.486241 |
| 2 | 6 | -9.22 | 2.627087 | 7.814609 | 9.409537 | 8.070946 |
| 2 | 7 | 2.74 | 3.252819 | 9.675929 | 11.650743 | 9.993321 |
| 3 | 4 | -4.06 | 5.146897 | 15.310109 | 18.434835 | 15.812316 |
| 3 | 5 | -5.01 | 3.516000 | 10.458796 | 12.593390 | 10.801868 |
| 3 | 6 | -7.77 | 3.119223 | 9.278532 | 11.172239 | 9.582889 |
| 3 | 7 | 4.19 | 3.661802 | 10.892503 | 13.115615 | 11.249803 |
| 4 | 5 | -0.95 | 5.011683 | 14.907897 | 17.950533 | 15.396910 |
| 4 | 6 | -3.71 | 4.741757 | 14.104969 | 16.983731 | 14.567644 |
| 4 | 7 | 8.25 | 5.115027 | 15.215309 | 18.320686 | 15.714406 |
| 5 | 6 | -2.76 | 2.890669 | 8.598669 | 10.353619 | 8.880725 |
| 5 | 7 | 9.20 | 3.469180 | 10.319525 | 12.425694 | 10.658029 |
| 6 | 7 | 11.96 | 3.066351 | 9.121257 | 10.982866 | 9.420455 |

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There is no difference between mean RHL of adders from localities within 20km to the mainland and localities farther than 20km to the mainland (95% CI -2.73 to 1.45 RHL)

Question 2:

1. Tukery-Kramer

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| i | j | pt est | SE(p test) | Lower Bound  pt est – M\*SE | Upper Bound  pt est + M\*SE | Difference in Annual Incomes in 2005 |
| 12 | 13-15 | -8011.061 | 2201.208 | -16508.5763 | 486.4549 | 16995.03 |
| **12** | **16** | **-33132.077** | **2571.268** | **-43058.1665** | **-23205.9871** | **19852.18** |
| 12 | <12 | 8563.448 | 4000.000 | -6878.1032 | 24004.9983 | 30883.10 |
| **12** | **>16** | **-39990.566** | **2648.781** | **-50215.8895** | **-29765.2435** | **20450.65** |
| **13-15** | **16** | **-25121.016** | **2773.450** | **-35827.6098** | **-14414.4224** | **21413.19** |
| **13-15** | **<12** | **16574.508** | **4132.869** | **620.0299** | **32528.9866** | **31908.96** |
| **13-15** | **>16** | **-31979.506** | **2845.462** | **-42964.0914** | **-20994.9201** | **21969.17** |
| **16** | **<12** | **41695.524** | **4341.280** | **24936.5010** | **58454.5478** | **33518.05** |
| 16 | >16 | -6858.490 | 3140.502 | -18982.0456 | 5265.0662 | 24247.11 |
| **<12** | **>16** | **-48554.014** | **4387.635** | **-65491.9844** | **-31616.0437** | **33875.94** |

All **bold** Tukey-Kramer intervals exclude zero. In conclusion, those with 12 and 16 years, 12 and >16 years, 13-15 and 16 years, 13-15 and <12 years, 13-15 and >16 years, 16 and <12 years, and <12 and >16 years of education differ in mean annual incomes in 2005 from each other. Refer to the last column in the table above for how many dollars of mean annual income these pairs differ by.

1. Dunnett

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| i | j (12) | p test | Lower Bound | Upper Bound | Difference in Annual Incomes in 2005 |
| **13-15** | **12** | **8011.0607** | **2551.1762** | **13470.9452** | **10919.77** |
| **16** | **12** | **33132.0768** | **26754.2947** | **39509.8590** | **12755.56** |
| <12 | 12 | -8563.4475 | -18485.0632 | 1358.1681 | 19843.23 |
| **>16** | **12** | **39990.5665** | **33420.5188** | **46560.6142** | **13140.1** |

All **bold** Dunnett intervals exclude zero. In conclusion, those with 12 years of education differ in mean annual income in 2005 from those with 13-15, 16, and >16 years of educations. Refer to the last column in the table above for how many dollars of mean annual income these pairs differ by.