

STAT217 SPRING 2005 EXAM 1 ANSWER KEY.

Multiple Choice:

1. C because it's a matched pairs t-test
2. D
3. B because 50 is in the CI
4. A
5. C
6. B because $F=MSG/MSE$
7. D

Choose the Correct Statistical Test:

1. D
2. A
3. E

Choose the Correct Assumptions:

1. BCF
2. ACDF

Show Your Work: Problems and Discussion:

1. (a) We do not need to assume that the data is normal because we have large sample sizes.
(b) $s_1=117.5$ is close to $s_2=111.3$, so we can use a pooled two sample t-procedure. However, to be conservative, you can always use an unpooled t-procedure.
(c) Using a pooled 95% CI, we use $t^*\sim t(152+139-2)=t(289)$, and get $t^*=1.984$, and so the 95% CI for $\mu_1-\mu_2$ is $(-71.8, -18.4)$. Using an unpooled 95% CI, we use $t^*\sim t(139-1)=t(138)$, and get $t^*=1.984$, and so the 95% CI for $\mu_1-\mu_2$ (remember, kids with ADHD is population 1) is $(-71.7, -18.5)$.
(d) We're 95% confident that children with ADHD have brains that are on average between 18.5 and 71.7 milliliters smaller than other children.
(e) $H_0: \mu_1=\mu_2$ $H_a: \mu_1<\mu_2$
(f) YES, we can use the CI from (d) to REJECT H_0 in (e) and conclude H_a . This is because 0 is NOT in the CI, and the endpoints of the CI are both negative.
2. (a) $H_0: \mu_1=\mu_2=\mu_3=\mu_4$
 H_a : at least one of the means are not equal to the others
(b) Since we have $p\text{-value}=.003<.05$, then: The evidence suggests that there is an effect of storage time on mean calcium content of wheat.
(c) From the Tukey's CI's, we see that μ_4 is significantly greater than μ_1 (see CI $(-4.9, -771)$) and that μ_4 is significantly greater than μ_2 (see CI $(-4.46, -.313)$). All of the other means are not significantly different (i.e. the other Tukey CI's contain 0).
(d) Store the wheat for 4 months.

3. (a) $DFA=2$
 $MSB=28.9$
 $F_{AB}=8.481$
 $DFE=24, SSE=38.04$
- (b) Since the interaction is insignificant ($p\text{-value} = .548$) and the main effect due to variety is significant ($p\text{-value}=0.000$), then average tomato yields are affected DIFFERENTLY depending on variety.
- (c) Use variety C and a planting density of 10000 plants per hectare since $\bar{x}_{31} = 16.3$ is the largest mean over all of the groups.