

Practice Problem Answers: One-way ANOVA with comparisons

1. A significant effect of stress on reaction time was observed, $F(2,15) = 10.64, p < .05$. Three comparisons among treatment means were conducted. The Bonferroni adjustment was applied, resulting in a per comparison alpha level of .033. Participants in the moderate stress condition did not perform significantly better than participants in either the low or high stress conditions, $F(1,15) = 4.77, p > .033$. Participants in the high stress condition performed significantly better than participants in either the low or moderate stress conditions, $F(1,15) = 21.26, p < .033$. Participants in the moderate stress condition did not perform significantly better than participants in the low stress condition, $F(1,15) = 0.02, p > .033$. These results thus provide support for theory B.
2. There was a significant effect of noise on the ability to concentrate, $F(2,9) = 47.83, p < .05$. Comparisons among treatment means indicated that participants in the moderate noise condition performed significantly less well than participants in the low noise condition, $F(1,9) = 69.17, p < .05$. No significant difference in performance was observed between participants in the moderate and high noise conditions, $F(1,9) = .09, p > .05$.
3. A significant effect of sleep deprivation on memory function was observed, $F(3, 16) = 31.056, p < .001$. Participants who were sleep deprived, regardless of the amount of sleep deprivation, performed significantly less well than participants who were not sleep deprived, $F(1, 16) = 71.32, p < .001$. Participants who were sleep deprived for 24 hours performed significantly less well than participants who were sleep deprived for 18 hours, $F(1, 16) = 16.38, p < .001$. Participants who were sleep deprived for 48 hours performed significantly less well than participants who were sleep deprived for 24 hours, $F(1, 16) = 16.38, p < .001$.
4. A significant effect of stress on memory performance was observed, $F(2,9) = 27.55, p < .05$. Comparisons among treatment means indicated that participants in the moderate stress condition performed significantly better than participants in the low stress condition, $F(1,9) = 46.34, p < .05$. Participants in the moderate stress condition also performed significantly better than participants in the high stress condition, $F(1,9) = 34.56, p < .05$.
5. The investigator should consider using the Bonferroni adjustment in order to keep the family-wise alpha level from getting above .15. When the investigator takes this maximum family-wise alpha level of .15 and divides it by the number of planned comparisons they want to do (5), they end up needing to use an adjusted per-comparison alpha level of .03.
6. *Predictions:* The investigator predicts that a significant effect of the drug on the ability to concentrate will be observed. The investigator also predicts that children with ADD who receive the drug will perform significantly better than children with ADD who do not receive the drug. Children who receive either 4 mg or 6 mg of the drug are predicted to perform significantly better than children who receive 2 mg of the drug. Children who receive 6 mg of the drug are predicted to perform significantly better than children who receive 4 mg of the drug.

Conclusions: A significant effect of the new drug for ADD on the ability to maintain attention was observed, $F(3, 20) = 16.77, p < .001$. Children with ADD who received the drug performed significantly better than children with ADD who did not receive the drug, $F(1, 20) = 16.56, p < .001$. Children who received either 4 mg or 6 mg of the drug performed significantly better than children who received 2 mg of the drug, $F(1, 20) = 28.52, p < .001$. Children who received 6 mg of the drug performed significantly better than children who received 4 mg of the drug, $F(1, 20) = 5.21, p = .034$.