

**Problem Set 4 Answers**  
**[35 points total]**

**Chapter 10**

- #4. a. The difference between the two sample means determines the numerator of the  $t$  statistic; as the difference increases, the value of the  $t$  statistic increases. **[2 POINTS]**
- b. The size of the two samples influences the magnitude of the standard error in the denominator of the  $t$  statistic. As the sample size increases, the (absolute) value of  $t$  also increases. **[2 POINTS]**
- c. The variability of the scores influences the standard error in the denominator of the  $t$  statistic; as the variability of the scores increase, the value of the  $t$  statistic decreases. **[2 POINTS]**
- #6. a. The first sample has variance of 7, the second sample variance is 9, and the pooled variance is 8 (halfway between) **[2 POINTS]**
- b. The first sample has variance of 7, the second sample variance is 3, and the pooled variance is  $80/20 = 4$  (closer to the variance of the larger sample) **[2 POINTS]**
- #14. a. The pooled variance is 90, the standard error is 5, and  $t = 14/5 = 2.80$ . With  $df = 13$  the critical value is 2.160. Reject the null hypothesis and conclude that there is a significant difference in attitude between males and females. **[4 POINTS]**
- b.  $r^2 = 7.84/20.84 = .376$  or 37.6%. **[2 POINTS]**
- #18. The null hypothesis states that personality has no effect on frustration,  $H_0: \mu_1 = \mu_2 = 0$ . With  $\alpha = .01$ , the critical region consists of  $t$  values beyond  $\pm 2.977$ . The pooled variance is 100, the standard error is 5, and  $t(14) = 2.60$ . Fail to reject  $H_0$  and conclude that there is no significant difference between the two personality groups. **[5 POINTS]**

**Chapter 11**

- #2 The primary advantage of a repeated measures design over an independent-measures design is that the repeated-measures study eliminates variability due to individual differences. The usually results in a smaller variability and produces a smaller standard error, which increases the likelihood of a significant difference. **[2 POINTS]**
- #10 a. The null hypothesis states that losing one night's sleep will have no effect on performance. For these data, the same variance is 120, the standard error is 2.5, and  $t = 6.3/2.5 = 2.52$ . With  $df = 19$  the critical value is 2.093, therefore reject the null hypothesis. **[4 POINTS]**
- b. Cohen's  $d = 6.3$  divided by the square root of 125, which is .564. **[2 POINTS]**

#12 a. The null hypothesis states that Ritalin has no effect and there is no change in attention span. For these data the standard error is 1.1 and  $t = 6.8/1.1 = 6.18$ . With  $df = 24$ , the critical value is 2.797, therefore reject the null hypothesis. **[4 POINTS]**

b. For these data,  $r^2 = 38.19/62.19 = .614$  (61.4%), and Cohen's  $d = 6.8/5.5 = 1.24$ . **[2 POINTS]**