**Week 4 Problems—30 points**

**10 points per problem.**

* The mean body mass index (BMI) for boys age 12 is 23.6. An investigator wants to test if the BMI is higher in 12-year-old boys living in New York City. How many boys are needed to ensure that a two-sided test of hypothesis has 80% power to detect a difference in BMI of 2 units? Assume that the standard deviation in BMI is 5.7.

 Alpha = \_\_\_\_\_\_\_\_

 Z1-α/2= \_\_\_\_\_\_\_\_

 Z1-β = \_\_\_\_\_\_\_\_

 ES = \_\_\_\_\_\_\_\_

 n= \_\_\_\_\_\_\_\_

2. An investigator wants to estimate caffeine consumption in high school students. How many students would be required to estimate the proportion of students who consume coffee? Suppose we want the estimate to be within 5% of the true proportion with 95% confidence.

 Alpha = \_\_\_\_\_\_\_\_

 Z= \_\_\_\_\_\_\_\_

 p= \_\_\_\_\_\_\_\_

 Effect Size = \_\_\_\_\_\_\_\_

 n= \_\_\_\_\_\_\_\_

3. A crossover trial is planned to evaluate the impact of an educational intervention program to reduce alcohol consumption in patients determined to be at risk for alcohol problems. The plan is to measure alcohol consumption (the number of drinks on a typical drinking day) before the intervention and then again after participants complete the educational intervention program. How many participants would be required to ensure that a 95% confidence interval for the mean difference in the number of drinks is within 2 drinks of the true mean difference? Assume that the standard deviation of the difference in the mean number of drinks is 6.7 drinks.

 Z= \_\_\_\_\_\_\_\_

 s= \_\_\_\_\_\_\_\_

 Effect Size = \_\_\_\_\_\_\_\_

 n= \_\_\_\_\_\_\_\_