

Chapter 8: Homework Problems

1. An investigator wishes to determine if sitting upright in a chair versus lying down on a bed will affect a person's blood pressure. The investigator decides to use each of 10 patients as his or her own control and collects systolic blood pressure data in both the sitting and lying down positions, as given in the table below. Adapted from a problem in a previous edition.

Table 8.1. Effect of position on level of blood pressure (mm Hg).

Patient	Sitting upright	Lying down
1	142	154
2	100	106
3	112	110
4	92	100
5	104	112
6	100	100
7	108	120
8	94	90
9	104	104
10	98	114

- a. Does this design constitute a paired or unpaired situation? On what basis did you make your decision?
 - b. What are the null and alternative hypotheses in this situation? State these in words and depict these as mathematical equations.
 - c. What are the critical values for the difference in blood pressure on the t-score scale? On the scale of mm Hg?
 - d. Test the hypothesis that the mean effect of position on blood pressure level for this group of patients is zero. What are the value of the test statistic and number of degrees of freedom associated with it? How does the value of the test statistic relate to the critical values on the t-score scale obtained in part c? How does the mean difference in blood pressure for the two positions relate to the critical values on the mm Hg scale obtained in part c?
 - e. Compute the p-value for the hypothesis test in part d.
 - f. Compute the two-sided confidence interval for the true mean difference in blood pressure of the population of patients from which this sample was taken.
 - g. How do your answers to parts d, e, and f relate?
 - h. What would your results be if you incorrectly used an unpaired hypothesis test?
2. Use the data from problems 8.49-8.52 on page 342 to answer the following questions.
- a. Does this design constitute a paired or unpaired situation? On what basis did you make your decision?
 - b. What are the null and alternative hypotheses in this situation? State these in words and depict these as mathematical equations.
 - c. What are the critical values on the t-score scale for the difference in the mean for birth weights of infants whose mothers received one of the two treatments? On the pounds scale?

- d. Test the hypothesis that the difference in the mean effects of the two treatments on birth weights for this group of patients is zero. What are the value of the test statistic and number of degrees of freedom associated with it? How does the value of the test statistic relate to the critical values on the t-score scale obtained in part c? How does the difference between the mean birth weights of the two groups of infants relate to the critical values on the pounds scale?
- e. Compute the p-value for the hypothesis test in part d.
- f. Compute the two-sided confidence intervals for the true means of birth weights for the populations of babies whose mothers received either drug A or placebo on a one-time-only basis between the 24th and 28th weeks of pregnancy.
- g. How do your answers to parts d, e, and f relate?
- h. What would your results be if you incorrectly used a paired hypothesis test?

Chapter 9: Homework Problems

1. Use the data from problem 9.4-9.6 on page 127 of the *Study Guide* to answer the following questions.
 - a. Does this design constitute a paired or unpaired situation? On what basis did you make your decision?
 - b. What are the null and alternative hypotheses in this situation? State these in words and depict these as mathematical equations.
 - c. What are the critical values for the median difference in percent glycosolated hemoglobin on the z-score scale?
 - d. Test the hypothesis that the median effect of this protocol involving nasal spray on glycosolated hemoglobin is zero. What are the value of the test statistic and number of degrees of freedom associated with it? How does the value of the test statistic relate to the critical values obtained in part?
 - e. Compute the p-value for the hypothesis test in part d.
 - f. Use the exact test and compute the p-value?
 - g. Which answers are correct and why?
2. Use the data from problems 9.16-9.18 on page 128 of the *Study Guide* to answer the following questions.
 - a. Does this design constitute a paired or unpaired situation? On what basis did you make your decision?
 - b. What are the null and alternative hypotheses in this situation? State these in words and depict these as mathematical equations.
 - c. What are the critical values for the median difference in blood pressure on the z-score scale?
 - d. Test the hypothesis that the median effect of this protocol involving transcendental meditation is the same as the median effect of standard psychotherapy for this group of patients is zero. What are the value of the test statistic and number of degrees of freedom associated with it? How does the value of the test statistic relate to the critical values obtained in part c and the mean difference in anxiety for the two therapies?
 - e. Compute the p-value for the hypothesis test in part d.