

BST 140.651**Problem Set 8****Due in the biostat main office on December 20th**

Problem 1. Obstetric records of a group of children who died suddenly and unexpectedly, S.U.D., were compared with those of a group of live control children. Observations on the duration of the 2nd state of labor were as follows:

Time in minutes:	
S.U.D.	60, 25, 6, 8, <5, 10, 25, 15, 10,
Controls	13, 20, 15, 7, 75, 120*, 10, 100, 9, 25, 30
* Terminated by surgical intervention	

Compare the median duration of labor in the two groups and test the significance of the difference using the Wilcoxon test.

Problem 2. Independent random samples of size 4 and 2 are taken from 2 continuous populations. Enumerate all possible rank collections for the smaller sample. Obtain the null distribution of the Mann-Whitney (Wilcoxon-Rank Sum) test statistic.

Problem 3. A large survey of over 100,000 births in South Wales during the period 1956-1962 gave an incidence rate for spina bifida of 4.12 per 1,000 births. In a random sample of 1000 births, compute the probability of observing (i) no cases, (ii) one case, (iii) two cases. Using the following two approaches

- a. The exact distribution based on the binomial distribution
- b. Approximate probabilities based on a Poisson approximation to the binomial

Problem 4. A cohort study was performed to evaluate the relation between oral-contraceptive use and breast cancer in the age group 40-44. At enrollment, women were classified as current user, past user or never user of oral contraceptives.

OC Use	Cancer Cases	Person-Years
Current user	13	4,761
Past user	164	121,091
Never user	113	98,091

- a. Calculate the breast cancer incidence rates in the 3 groups along with 95% confidence intervals. State your assumptions.

- b. Is there a significant difference in incidence rates between current users and never users? How about between past users and never users? Perform hypothesis test, report a p-value and interpret your findings.
- c. Calculate the ratio of incidence rates comparing current users versus never users along with a 95% confidence interval for this ratio.