

0. Read Chapters 5, 6, & 8 in NSI book by yourself.

1. (Exercise 5.4 (2) on page 219 of NSI book)

Answer parts (a) through (d) using the Wilcoxon signed-rank test procedure.

(a) Test at a significance level not exceeding 0.10 the null hypothesis  $H_0 : M = 2$  against the alternative  $H_1 : M > 2$ , where  $M$  is the median of the continuous symmetric population from which the random sample  $-3, -6, 1, 9, 4, 10, 12$  is drawn.

(b) Give the exact probability of a type I error in (a).

(c) On the basis of the following random sample of pairs:

|   |     |     |     |     |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|-----|-----|
| X | 126 | 131 | 153 | 125 | 119 | 102 | 116 | 163 |
| Y | 120 | 126 | 152 | 129 | 102 | 105 | 100 | 175 |

test at a significance level not exceeding 0.10 the null hypothesis  $H_0 : M = 2$  against the alternative  $H_1 : M \neq 2$ , where  $M$  is the median of the continuous and symmetric population of differences  $D = X - Y$ .

(d) Give the exact probability of a type I error in (c).

2. (Exercise 6.6 (ii) on page 272 of NSI book)

Answer parts (a) to (b) using the Mann–Whitney test procedure (use tables) for the following two independent random samples drawn from continuous populations which have the same form but possibly a difference of  $\theta$  in their locations:

|   |    |     |     |     |     |     |     |     |
|---|----|-----|-----|-----|-----|-----|-----|-----|
| X | 79 | 13  | 138 | 129 | 59  | 76  | 75  | 53  |
| Y | 96 | 141 | 133 | 107 | 102 | 129 | 110 | 104 |

(a) Using the significance level 0.10, test  $H_0 : \theta = 0$  versus  $H_1 : \theta \neq 0$ .

(b) Give the exact level of the test in (a).

3. (Exercise 8.6 on page 307 of NSI book)

Giambra and Quilter (1989) performed a study to investigate gender and age difference in ability to sustain attention when given Mackworth's clock-test. This clock is metal with a plain white face and a black pointer that moves around the face in 100 discrete steps of 368 each. During the test period, the pointer made 23 double jumps, defined as moving twice the normal distance or 7.28 in the same time period, at random and irregular intervals. Subjects were told that double jumps would occur and asked to signal their recognition of occurrence by pressing a button. Scores were the number of correct recognitions of the double jumps. The scores below are for 10 men aged 18-29 and 10 men aged 50-59. Determine whether median number of correct scores is larger for young men than for older men.

Age 18-29: 11, 13, 15, 15, 17, 19, 20, 21, 21, 22

Age 50-59: 8, 9, 10, 11, 12, 13, 5, 17, 19, 23