

Stat 296 Fall 2007  
November 8, 2007

For many decades the SAT (Scholastic Aptitude Test) has helped determine admission to the majority of US universities. Although the testing service claims that the exam is an objective measure of ability, students believe that taking preparation courses and practice exams would increase their chances of success. To examine one aspect to the issue, in the accompanying table are listed the verbal SAT scores of a random sample of 10 students who took the exam twice. Is there enough evidence to conclude that SAT scores improve the second time one takes the test?

| Student       | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1st SAT score | 551 | 629 | 445 | 636 | 513 | 433 | 571 | 325 | 429 | 358 |
| 2nd SAT score | 516 | 610 | 446 | 648 | 531 | 453 | 603 | 399 | 517 | 478 |
| Difference    | -35 | -19 | 1   | 12  | 18  | 20  | 32  | 74  | 88  | 120 |

- (a) Use the sign test (Section 4.3) to answer the question.
- (b) Use the Wilcoxon signed-rank test (Section 4.2) to answer the question.
- (c) Although the Mann-Whitney test might be able to address the question of whether the first test scores tend to be lower than the second test scores, explain why it should not be used with the data given above.
- (d) Compute the Spearman rank correlation coefficient, and test to see whether there is significant positive correlation. State clearly what question the test addresses and provide a conclusion that deals with that question.
- (e) Compute Kendall's tau coefficient and test its significance.