QUESTION Eight golfers play a round of golf on two consecutive Saturdays. On the first Saturday they returned scores of 72,89,69,70,85,71,96,86 and on the second Saturday in the same order 72,80,71,70,82,72,90,84.

(a) Assuming that the differences in their scores are drawn from a normal population, is there significant evidence that their golf has improved?

(b) Carry out the appropriate test of the scores for the second Saturday had been given to you in a different and unknown order.

ANSWER

72	82	69	70	85	71	96	86
72	80	71	70	82	72	90	84

$H_0 : \mu_1 = \mu_2 \quad H_1 : \mu_1 > \mu_2 \quad \alpha = 5\%$

(a) assuming paired sample data

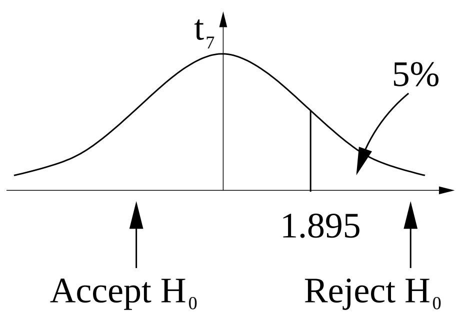
d	0	2	-2	0	3	-1	6	2

$H_0 : \mu_d = 0 \quad H_1 : \mu_d \neq 0$

Test 4a, Paired sample, two means. $z = \frac{\overline{d}-0}{\frac{s_d}{\sqrt{n}}} \sim t_n$

$\overline{d} = 1.25 \quad s_d = 2.5495 \quad n = 8$

$z = \frac{1.25}{\frac{2.5495}{\sqrt{8}}} = 1.39$
is not significant.
Hence accept H_0.



(b) Assuming independent data

$$\begin{aligned} \overline{x}_1 &= 78.875 \\ s_1 &= 9.8334 \\ overlinex_2 &= 77.625 \\ s_2 &= 7.4054 \\ n_1 &= n_2 = 8 \end{aligned}$$

Test 4, assume normal distribution, variances equal.

$$z = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{\{s^2(\frac{1}{n_1} + \frac{1}{n_2})\}}}$$

$$s^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2} \sim tn_1 + n_2 - 2$$

$$
\begin{aligned}
s &= 8.7045 \\
z &= \frac{1.25}{8.7045\sqrt{\frac{1}{8}+\frac{1}{8}}} = 0.29
\end{aligned}
$$

Clearly not significant as t_{14} hence accept H_0. Test in (b) much less sensitive.