

CIMT Further Statistics - p82 Example

Assumption: Distribution of differences is symmetrical.

Justification: paired data
no assumptions about type of distribution

H_0 : population median difference, $\eta_D = 0$ (weights make no difference)

H_1 : population median difference, $\eta_D > 0$ (weights make run faster)

where difference = before - after.

Assume H_0 to be true.

$$\alpha = 5\%$$

1 tail test

$$\begin{aligned} \text{So } W_+ &= 1 + 2 + 3.5 + 5 + 6 + 8 + 9 + 10 + 11 = 55.5 \\ W_- &= 3.5 + 7 = 10.5 \end{aligned} \quad \left. \begin{array}{l} \\ \end{array} \right\} 55.5 + 10.5 = 66$$

$$\frac{1}{2} \times 11 \times 12 \quad \checkmark \text{ check.}$$

we had one tied pair of 0, so only 11 pieces of data, $n = 11$

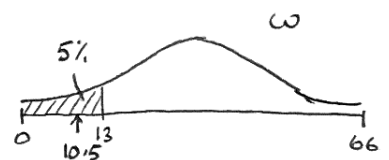
$$\text{now } W = \min(W_-, W_+) = 10.5$$

$$\text{lowest } W = 0$$

$$\text{highest } W = 66$$

under H_0 , W should be ≈ 33 .

$P(W \leq 10.5)$ is what we want



From tables, $n = 11$, $P(W \leq 13) = 0.05$.

so we have $P(W \leq 10.5) < 0.05$

Hence we are in critical region, and we reject H_0 .

We have evidence to suggest that the population median difference is greater than zero (i.e. weights make them run faster)