CIMT Further Stats p74 Example.

X = "difference" in scores. (where difference = experimental − control)

X is assumed Normal, as given in question

$X \sim N(\mu, \sigma^2)$

Pair	1	2	3	4	5	6	7	8	9	10
Control	72	82	93	65	76	89	81	58	95	91
Experimental	75	79	84	71	82	91	85	68	90	92
E − C	3	−3	−9	6	6	2	4	10	−5	1

$H_0: \mu = 0$

$H_1: \mu > 0$.

Assume H_0 to be true

$\alpha = 5\%$.

one tailed test

we estimate σ^2 from (E−C)'s $s_{n-1} = 5.72033$ and we have $n = 10$ (small) so we use a t-test on the differences (so turning this into a single sample t-test)

we also know that $\bar{x} = 1.5$

so $X \sim N(0, \sigma^2)$

$\bar{X} \sim N\left(0, \frac{\sigma^2}{10}\right)$ where $\bar{X}$ = mean difference

$$\frac{\bar{X} - 0}{\sqrt{\frac{\sigma^2}{10}}} \sim N(0, 1^2)$$

so $t = \frac{\bar{x} - 0}{\sqrt{\frac{s_{n-1}^2}{10}}}$ is a value from the t_9 distribution.

$$p\text{-value} = P\left(t_9 > \frac{1.5 - 0}{\sqrt{\frac{5.72^2}{10}}}\right)$$

$$= P(t_9 > 0.82922)$$

$$= 0.214212$$

$$> 0.05$$

so we have no evidence to reject H_0. We do not have evidence to suggest that the mean difference in scores is better for experimental, than control. This suggests that the educational computer package does not deliver improvements in pupils' understanding of geometry.

on TI-Nspire > Menu > Stats > Stat Tests > t Test on differences

NOT 2-Sample t Test (which is used for non-paired data)