

Chapter 8 Review

#4. A test of abstract reasoning is given to students before & after taking a logic course. Is the average higher after the course? Test this at a 1% significance level. (Assume the distribution of all differences is normal.)

Matched Pairs

x = Before	73	77	71	77	77	67	95	83	84	75
y = After	76	83	75	88	88	63	93	84	91	77
d = x - y	-3	-6	-4	-11	-11	4	2	-1	-7	-2

- Parameter: mean difference $\mu_d = \mu_1 - \mu_2$ (Left tail)
- Hypotheses: $H_0: \mu_1 = \mu_2$ ($\mu_d = 0$), $H_1: \mu_1 < \mu_2$ ($\mu_d < 0$)
- Gather Data: $\bar{d} = -3.9$, $s_d = 5.0$, $n = 10$, $\alpha = .01$
- Requirements: Pop. of differences (d) is normal.
- Test Statistic: $t = \frac{\bar{d} - \mu_d}{s_d / \sqrt{n}} = \frac{-3.9 - 0}{5.0 / \sqrt{10}} = -2.47$ (std. errors)

→ Critical Value

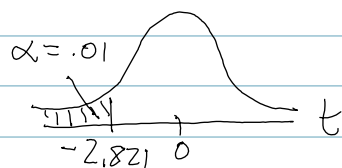


Table A2	df	$\alpha = .01$ one tail
	$\downarrow$	$\downarrow$
	$n-1 = 9$	$\rightarrow 2.821$

→ p-value (t-distribution $\rightarrow$ Table A3)

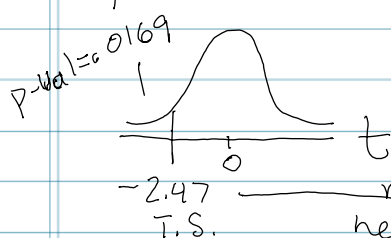


Table A3	df	$\rightarrow n-1 = 9$
$\downarrow$	T.S.	$\downarrow$
$\downarrow$	-2.5	$\downarrow$
		0.0169

round to nearest tenth

→ Conclusion: $p\text{-val} = .0169 > .01 = \alpha \rightarrow$ Fail to Reject H_0

The data do not support the claim that the mean of scores after taking a logic class is higher than before the class.