T-Test

These values of the one-sample statistics are identical to the values that would be provided by the “Frequencies” or “Descriptives” commands.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Score on Quiz	9	7.0000	1.22474	.40825

The “Standard Error of the Mean” provides an estimate of how spread out a distribution of possible random sample would be. Here it’s calculated as:

$$SE_M = SD/\sqrt{N} = 1.22474/\sqrt{9} = .40825$$

One-Sample Test

	Test Value = 6					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
Score on Quiz	2.449	8	.040	1.00000	.0586	1.9414

The “Mean Difference” is the difference between the sample mean (M = 7) and the user-specified test value (u = 6). For the example, the sample had a mean one point higher than the test value. This raw effect size is important for both the significance test and the confidence interval.

The “t”, “df”, and “Sig.” columns provide the results of the statistical significance test. First, “t” provides the standardized statistic for the mean difference:

$$t = M - u/SE_M = 1/.40825 = 2.449$$

The *t* statistic follows a non-normal (studentized or t) distribution that depends on degrees of freedom. Here, df = N – 1 = 9 – 1 = 8. SPSS calculated that a *t* with 8 df that equals 2.449 has a two-tailed probability of .040.

This section provides a confidence interval around (centered on) the “Mean Difference.” Calculation requires the appropriate critical value. Specifically, the *t* statistic (with 8 df) that has a probability of .05 would equal 2.306 (see Critical Values of the *t* Distribution).

$$CI_D = M_D \pm (CV_t)(SE_M) = 1 \pm (2.306)(.40825)$$

Thus, the researcher would have 95% confidence that the interval ranging from .0586 to 1.9414 covers the true population mean difference.