Tool:

Test of Normality: test if pop. distn is normal using a random sample from that pop.
x

H_0: pop is normal

H_1: pop is NOT normal

⇒ p-value = large ⇒ pop is normal

small ⇒ —— NOT normal.

Recap: to examine if a sample is from a pop that is normal: ⊖ hist + normal density curve
⊖ qq plot
⊖ Normality test ⇒ Shapiro Wilk test

in R: shapiro.test(x)

Weight of males & Females (gender affects weight)

$\mu_1 \longleftrightarrow \mu_2$

$\mu = 3.3$ X

Males: 100 pp ⇒ $\bar{Y}$ $\quad \bar{X} \to \mu_2$

Females: 100 pp ⇒ $\bar{X}$ $\quad \bar{Y} \to \mu_1$

μ_1 vs μ_2: H_0: $\mu_1 - \mu_2 = 0$

H_1: $\mu_1 - \mu_2 \neq 0$ ←
< 0 ←
> 0 ←

group 1 from pop 1 ⇒ σ^2 } σ_1^2

group 2 from pop 2 ⇒ σ^2 } σ_2^2

⇒ sample variance: s_1^2 → σ_1^2

: s_2^2 → σ_2^2

9 9.5 ?

9 18

Tool: Test of equal variance: H_0: 2 variances are equal

H_1: ——— NOT equal

→ p-value?

in R: var.test(x, y)

Bartlett ⇒ when samples are ~ normal

Levene ⇒ ——— NOT normal

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one sample: $T = \frac{\bar{X} - 3.3}{SE(\bar{X})} \sim t_{n-1}$ $H_0: \mu = 3.3$

two sample: $H_0: (\mu_1 - \mu_2) = 0$

$$T = \frac{(\bar{X} - \bar{Y}) - 0}{SE(\bar{X} - \bar{Y})}$$

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paired samples:

	X		Y		D	
1	X_1	→	Y_1	→	D_1	Y - X or X - Y
:	:		:			
n	X_n	→	Y_n	→	D_n	

μ_X vs μ_Y

μ_D vs 0

$\mu_D = 0$

Bartlett test: test if variances of groups are the same.

⇒ used if the groups are normal.

H_0: the variances are the same.

Levene test → similar to bartlett test but for groups → non normal