GENERIC HYPOTHESIS TESTING (aka SIGNIFICANCE TESTING)

STEP 1: Determine null and alternative hypotheses

$H_0: \begin{cases} parameter \leq null\ value \\ parameter = null\ value \\ parameter \geq null\ value \end{cases}$ select one   **Nothing is happening, status quo, equality**

$H_a: \begin{cases} parameter > null\ value \\ parameter \neq null\ value \\ parameter < null\ value \end{cases}$ select the converse of H₀   **Something is happening, change from status quo, inequality**

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H_0: There is not a relationship / association (independence)   **Nothing is happening, status quo, independence, no relationship/association**

H_a: There is a relationship / association (dependence)   **Something is happening, change from status quo, dependence, relationship/association**

STEP 2: Verify necessary data conditions/assumptions, and if met, summarize the data into an appropriate test statistic

Test stat: $t\ or\ z = \dfrac{sample\ stastic\ -\ null\ value}{null\ standard\ error}$

$X^2 = \dfrac{observerd - expected}{expected}$

CONDITIONS / ASSUMPTIONS
Independent random sample(s)
Assumptions regarding - sample sizes, expected counts, SHAPE(S) - symmetry or skewness SPREAD / DISPERSION (variance, outliers)

STEP 3: Assuming the null hypothesis is true, determine degrees of freedom (d.f.) and calculate the p-value

p-value: $\begin{cases} d.f.\ are\ determined\ by \\ the\ sample\ size(s) \end{cases}$ $\begin{cases} for\ H_a\ parameter < null\ value;\ p-value = area\ below\ t\ or\ z \\ for\ H_a\ parameter \neq null\ value;\ p-value = 2 \times area\ above\ |t|\ or\ |z| \\ for\ H_a\ parameter > null\ value;\ p-value = area\ above\ t\ or\ z \end{cases}$

STEP 4: Compare p-value and alpha to determine statistical significance

$\begin{cases} if\ p\ value > significance\ level\ then \begin{cases} fail\ to\ reject\ H_0 \\ evidence\ supports\ the\ null\ (eg\ p > .05) \\ (\textbf{not}\ statistically\ significant) \end{cases} \\ if\ p\ value \leq significance\ level\ then \begin{cases} reject\ H_0 \\ evidence\ does\ \textbf{not}\ support\ the\ null\ (eg\ p \leq .05) \\ (statistially\ significant) \end{cases} \end{cases}$

Strong evidence (p < .01)
Evidence (.01 ≤ p ≤ .05)
Marginal evidence (.05 < p < .10)
Lack of evidence (p ≥ .10)

STEP 5: Report the conclusion in the context of the hypothesized question

Conclusion is based / framed in the context of the alternative hypothesis H_a

There (**is** / **is not**) statistical evidence, at the (**1%, 5%, 10%**) significance level, to support the claim postulated by the alternative hypothesis.