

Assumptions in Statistical Testing

Every test on this site sorts its assumptions into three categories: facts it calculates directly, evidence you should review, and facts only you can verify. This page explains why that split exists and how to use it.



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What this answers

This page answers "how do I know whether a test's assumptions actually hold for my data?" No calculator can confirm every assumption behind a statistical test, because some assumptions are facts about how the data were collected, not facts visible in the numbers themselves. This page explains the three-part structure used in every StatReason engine's Assumption Audit.

Calculated from your data

Some assumptions can be checked directly from the values you enter: sample size, missing or excluded values, observed variance in each group, the number of tied ranks, or expected cell counts in a table. Every engine on this site reports these facts automatically wherever the underlying method depends on them, so you never have to compute them separately.

Evidence to review

Some assumptions are partially visible in the data but need a human judgment call to interpret, such as whether a distribution looks approximately normal, whether variance looks similar across groups, or whether a scatter plot shows a linear pattern. These are supported by a diagnostic plot or a formal test, such as a Q-Q plot or Shapiro-Wilk test for normality, but the interpretation of "close enough" still requires a judgment this site will not make for you.

You must verify

Some assumptions are entirely about your study design and can never be checked from the numbers alone: whether observations are truly independent, whether two columns represent genuine pairs, whether a sample was randomly selected, or whether an experiment supports a causal claim. No amount of statistical computation can substitute for knowing how your data were actually collected.

Worked example

Running an independent t-test, the calculator reports sample size and observed variance in each group automatically (calculated from your data). It also runs a variance-equality check and suggests reviewing a histogram if the groups look skewed (evidence to review). It cannot tell you whether the two groups were genuinely independently sampled rather than secretly paired, which you must verify from your own study design before trusting the result.

Assumption audit

Calculated from your data: exactly the facts this section is named for on every engine page: sample size, missing values, variance, ties, or expected counts, as applicable to that specific test.

Evidence to review: diagnostic plots and secondary tests this site provides alongside the primary result, meant to inform your judgment rather than replace it.

You must verify: independence, pairing, random sampling, and causal design facts, none of which any calculator on this or any other site can confirm from data alone.

Source

This three-part structure follows standard statistical-methods teaching on test assumptions and reflects the shared statistical reasoning contract every StatReason engine is built against.

Limitations

This page describes the general structure used across the site; the specific assumptions relevant to a given method are listed on that method's own engine page, not repeated here.

Next action: use **Choose the Right Statistical Test** to find your test, then read its own Assumption Audit for the specific facts that apply.