

# Statistical Tests Implementation

## T-Test (ttest1)

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dttest
- @stdlib/stats/strided/sttest
- @stdlib/stats/strided/ttest ( only JS)

### Missing Dependencies (Require C Implementation)

- t-distribution CDF
- t-distribution quantile

### Reference

- **Wikipedia:** [ttest](#)
- **SciPy:** [ttest](#)
- **Difficulty:** Medium

## T-Test2 (ttest2)

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dttest2
- @stdlib/stats/strided/sttest2
- @stdlib/stats/strided/ttest2 ( only JS)

## Missing Dependencies (Require C Implementation)

- t-distribution CDF
- t-distribution quantile

## Reference

- **Wikipedia:** [ttest](#)
- **SciPy:** [ttest](#)
- **Difficulty:** Medium

## ANOVA1

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/danova1
- @stdlib/stats/strided/sanova1
- @stdlib/stats/strided/anova1 ( only JS)

## Missing Dependencies (Require C Implementation)

- f-distribution CDF

## Reference

- Should be implemented before levene test.
- **Wikipedia:** [Anova1](#)
- **SciPy:** [anova1](#)
- **Difficulty:** Medium

## Bartlett Test

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dbartlett-test
- @stdlib/stats/strided/sbartlett-test
- @stdlib/stats/strided/bartlett-test ( only JS)

### Missing Dependencies (Require C Implementation)

- None

### Reference

- **Wikipedia:** [bartlett](#)
- **SciPy:** [Bartlett](#)
- **Difficulty:** Easy

## Binomial Test

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dbinomial-test
- @stdlib/stats/strided/sbinomial-test
- @stdlib/stats/strided/binomial-test ( only JS)

### Missing Dependencies (Require C Implementation)

- binomial CDF
- beta quantile

### Reference

- **Wikipedia:** [binomial](#)
- **SciPy:** [binomial](#)

# Chi2gof Test

## Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dchi2gof
- @stdlib/stats/strided/schi2gof
- @stdlib/stats/strided/chi2gof ( only JS)

## Missing Dependencies (Require C Implementation)

- negative binomial PMF

## Reference

- **Wikipedia:** [chi2gof](#)
- **SciPy:** [chi2gof](#)
- **Difficulty:** Difficult

# Chi-Square Test (chi2test)

## Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dchi2test
- @stdlib/stats/strided/schi2test
- @stdlib/stats/strided/chi2test ( only JS)

## Missing Dependencies (Require C Implementation)

- None

## Reference

- **Wikipedia:** [chi2test](#)
- **SciPy:** [chi2test](#)
- **Difficulty:** Difficult

## Variance Test (vartest)

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dvartest
- @stdlib/stats/strided/svartest
- @stdlib/stats/strided/vartest ( only JS)

### Missing Dependencies (Require C Implementation)

- F-distribution CDF
- F-distribution quantile

### Reference

- **Wikipedia:** [vartest](#)
- **SciPy:** [vartest](#)
- **Difficulty:** Medium

## Fligner Test

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dfligner-test
- @stdlib/stats/strided/sfligner-test
- @stdlib/stats/strided/fligner-test ( only JS)

### Missing Dependencies (Require C Implementation)

- None

### Reference

- **Wikipedia:** [fligner](#)
- **SciPy:** [fligner](#)
- **Difficulty:** Medium

## Kruskal Test

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dkruskal-test
- @stdlib/stats/strided/skruskal-test
- @stdlib/stats/strided/kruskal-test ( only JS)

### Missing Dependencies (Require C Implementation)

- None

### Reference

- **Wikipedia:** [kruskal](#)
- **SciPy:** [kruskal](#)
- **Difficulty:** Medium

## KS Test (kstest)

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dkstest
- @stdlib/stats/strided/skstest
- @stdlib/stats/strided/kstest ( only JS)

### Missing Dependencies (Require C Implementation)

- beta CDF
- betaprime CDF
- erlang CDF
- F CDF
- lognormal CDF
- t CDF

## Reference

- **Wikipedia:** [kstest](#)
- **SciPy:** [kstest](#)
- **Difficulty:** Difficult

## Levene Test (depends on ANOVA1)

### Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dlevene-test
- @stdlib/stats/strided/slevene-test
- @stdlib/stats/strided/levene-test ( only JS)

### Missing Dependencies (Require C Implementation)

- Depends on `anova1`

### Reference

- **Wikipedia:** [levene](#)
- **SciPy:** [levene](#)
- **Difficulty:** Easy

# Wilcoxon Test

## Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dwilcoxon
- @stdlib/stats/strided/swilcoxon
- @stdlib/stats/strided/wilcoxon ( only JS)

## Missing Dependencies (Require C Implementation)

- signrank CDF

## Reference

- **Wikipedia:** [Wilcoxon](#)
- **SciPy:** [wilcoxon](#)
- **Difficulty:** Difficult

# Pearson Correlation Test (pcorrtest)

## Overview

We need to implement both JavaScript (JS) and C implementations for:

- @stdlib/stats/strided/dpcorrtest
- @stdlib/stats/strided/spcorrtest
- @stdlib/stats/strided/pcorrtest ( only JS)

## Missing Dependencies (Require C Implementation)

- t CDF

## Reference

- **Wikipedia:** [pcorrtest](#)
- **SciPy:** [pcorrtest](#)
- **Difficulty:** Medium

## Z-Test

### Overview

Already implemented.

### Reference

- JS: TRUE
- C: TRUE
- Status: Completed

## Z-Test2

### Overview

Already implemented.

### Reference

- **JS**: TRUE
- **C**: TRUE
- **Status**: Completed

## Alternative Hypothesis Resolvers and Results Object.

From the implementation in `stats/base/ztest`, I observed how it includes explicit handling of alternative hypotheses through enumeration mappings, string-to-enum mappings and resolver utilities, ensuring consistency throughout the codebase. Files like `alternative-str2enum`, `alternative-enum2str`, `alternative-resolve-enum`, `alternative-resolve-str` and `alternatives` would not be hard to implement, as their core purpose is to map strings to enums and vice versa, and they will mostly remain similar across tests that use alternative hypotheses.

Taking the reference from `stats/base/ztest`, we will follow this file directory pattern. It will handle the **enum-to-string** and **string-to-enum** resolvers and provide an already defined object for printing out the results. Here:-

```
stats/  
└─ base/ttest/  
    ├── alternative-enum2str/  
    ├── alternative-resolve-enum/  
    ├── alternative-resolve-str/  
    ├── alternative-str2enum/  
    ├── alternatives/  
    ├── one-sample/results/  
    └── two-sample/results/
```

Depending on the test, we use either a **one-sample** or **two-sample** result object. Taking reference from `stats/base/ztest` each `results/` directory will contain the following modules.

- **factory**: creates a reusable result object instance.
- **float32 / float64**: Ensuring the result object handles single and double precision floating point values correctly.
- **struct-factory**: Handles the low-level binary layout under the hood, which is what makes strided usage possible.
- **to-json** : Serializes the result object into a plain JSON-compatible object.
- **to-string**: renders a human-readable summary of the test result.

<b>Test's</b>	<b>Alternative hypothesis</b>
<code>levene-test</code>	Not applicable
<code>kruskal-test</code>	Not applicable
<code>fligner-test</code>	Not applicable
<code>chi2gof</code>	Not applicable
<code>bartlett-test</code>	Not applicable
<code>anova1</code>	Not applicable
<code>chi2test</code>	Not applicable

**Table 1: Tests Without Alternative Hypothesis (Results Object Only)**

<b>Test`s</b>	<b>Alternative Hypothesis resolver and results object</b>
<b>T-test &amp; t-test2</b>	Not started
<b>binomial-test</b>	Not started
<b>vartest</b>	Not started
<b>kstest</b>	Not started
<b>wilcoxon</b>	Not started
<b>pcorrttest</b>	Not started

**Table 2: Tests With Alternative Hypotheses (Full Implementation Required)**