Compliance sheet — star-quadrature

Everything a supplier qualification, a legal review or an export check usually asks about star-quadrature 0.1.0, in one document.

1. Identity

Document	STAR-PKG-STAR-QUADRATURE-EN · v2.3 · 2026-11-14
Package	star-quadrature
Version	0.1.0
Capability	star.numerics.gauss-legendre
Maturity	Released & Verified (RELEASED)
Python	>=3.9
Source commit	dc09f61d
Source	https://github.com/Andrea07072000/S.T.A.R.-/tree/main/packages/star_quadrature

2. Licence and obligations

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3. What it needs at run time

Nothing beyond the Python standard library: it works offline.

4. Integrity

SHA-256 fingerprints of the files published on this website. Check a downloaded file with:

```
python -c "import
hashlib,sys;print(hashlib.sha256(open(sys.argv[1],'rb').read()).hexdigest())" star_quadrature-
0.1.0-py3-none-any.whl
```

FILE	SHA-256
star_quadrature-0.1.0-py3-none-any.whl	853d77c7fef2cb0796ca9d8566e786139bfed16eace0f7a4851c149e5978d2f3
star_quadrature.py	2253aaa903aa2f21955c9bf0472ee17e596f642969e47b1daf702c5c31b8aa33
star_quadrature-0.1.0-source.zip	2bf80a21ae3bd368cee27efd9e7de4f6057273d6f95a55196f80ea2544db5085

5. What it does, and its limits

Gauss-Legendre nodes and weights for 1 to 32 points, each node the float nearest to the true root (exact coefficients, exact-sign bisection) and each weight evaluated exactly and rounded once; fixed-rule integration and Legendre polynomials with derivative; all 528 nodes and weights equal SymPy's 40-digit values rounded to a float.

Fixed rules only: no adaptive integration, no error estimate, no other weight functions (Gauss-Lobatto, Laguerre, Hermite, Kronrod), no rule beyond 32 points. The rule is exact only for polynomials up to degree 2n - 1; for any other function the result is an approximation whose error this module does not bound: singular, discontinuous or strongly oscillating integrands need more than a fixed rule. The first call for a given n builds the rule in exact arithmetic (about two seconds for all rules up to 32 points on a laptop); later calls are cached. `legendre` is double-precision recurrence, accurate to about 1e-14 relative to the size of the value.

- `gauss_legendre(n)` returns the n nodes (increasing) and the n weights of the rule on [-1, 1], for n from 1 to 32. Each node is the float nearest to the true root of P_n: the polynomial is built with exact coefficients and the root is found by bisection over the floats with the exact sign. Each weight is evaluated in exact arithmetic and rounded once. Nodes are exactly antisymmetric and weights exactly symmetric.
- `integrate(f, a, b, n)` applies the n-point rule to [a, b]; `legendre(n, x)` returns P_n(x) and P_n'(x) for x in [-1, 1] by the three-term recurrences (no division by 1 - x²).
- Measured on all 32 rules (528 nodes and weights): every node and every weight equals SymPy's 40-digit value rounded to a float. 400 Legendre values with derivatives and 120 exact integrals of

monomials agree with SymPy within 1e-14 relative; NumPy and SciPy agree within their own accuracy.

- Every function returns floats or raises `ValueError`: n that is not an integer in range (booleans and floats refused), x outside [-1, 1], limits that are not finite numbers within 1e150, f that is not callable or returns something that is not a finite real number, an overflowing result.

6. Export, use and certification

The package is published and freely available. That usually takes software out of export-control lists, but not every use of it: read the page on space activities and export control before using it in a controlled programme. It is not certified or qualified for flight; the evidence describes what was tested and how.

7. Citation and bill of materials

```
@software{cavazzini_star_quadrature_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-quadrature}: Gauss-Legendre quadrature},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_quadrature/},
  note    = {Apache-2.0. Source: https://github.com/Andrea07072000/S.T.A.R.-, commit dc09f61d}
}
```

CITATION.cff · BibTeX · SBOM CycloneDX 1.5 · SBOM SPDX 2.3

8. Warranty and liability

Provided "as is", without warranties or conditions of any kind (Apache License 2.0, sections 7 and 8), to the extent the law allows. This never excludes liability that the law does not allow to exclude.

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