Compliance sheet — star-poly

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

1. Identity

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

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_poly-0.1.0-
py3-none-any.whl
```

FILE	SHA-256
star_poly-0.1.0-py3-none-any.whl	2160a527334ecdc2004cedb4baf613b2ba7e3f727dbcd77dd7c3a1250a9f83ca
star_poly.py	48e0a38adaf7c7bef52feb07780c5c42ff7f62edfe5f8e92a078b095547287e7
star_poly-0.1.0-source.zip	1018a62e0fdd88d231f1c13f050829d4714f80f52e2bc76bfc2f00d8ca99e49e

5. What it does, and its limits

Distinct real roots of quadratics and cubics with the number of roots decided in exact arithmetic and each root isolated by exact-sign bisection, plus Horner evaluation; on 640 polynomials the count equals SymPy's exact count and every root equals the exact root rounded to a float; reproduces the classic cancellation example.

Real roots only: no complex roots, no quartics or higher degrees. "Exact" refers to the polynomial whose coefficients are the floats given: if those are rounded measurements, a nearly double root may be reported as two, one or none, and that is the correct answer for the numbers supplied. Two distinct roots closer than one float are returned as two neighbouring floats. The exact arithmetic makes these functions slower than a closed formula (tens to hundreds of microseconds): they are for correctness, not for inner loops. `evaluate` is plain double-precision Horner, not compensated.

- `quadratic_roots(a, b, c)` and `cubic_roots(a, b, c, d)` return the distinct real roots, sorted. The number of roots is decided by the discriminant computed in exact rational arithmetic: a double or triple root is reported once, and a polynomial with no real root returns an empty tuple.
- Each root is located inside an interval that holds no other root, by bisection over the floats driven by the exact sign of the polynomial (at most 64 steps, no starting guess): roots of very different size keep their digits and none is lost to a neighbour. `evaluate(coefficients, x)` returns the value and the first derivative (Horner).
- Measured on 640 quadratics and cubics (random, exact multiple roots, roots separated by up to 1e12, leading coefficients down to 1e-30): the number of real roots equals SymPy's exact count in every case, and every root equals the exact root rounded to a float; all are roots for mpmath at 60 digits and for NumPy.

- Every function returns floats or raises `ValueError`: a zero leading coefficient, a non-finite or non-numeric coefficient (booleans included), a coefficient beyond 1e60, a malformed coefficient list, 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_poly_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-poly}: Real roots of quadratics and cubics},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_poly/},
  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

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