Compliance sheet — star-linsolve

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

1. Identity

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

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

FILE	SHA-256
star_linsolve-0.1.0-py3-none-any.whl	d25db3fe0969af8fb036cfd5b3f72b12d152a77123e9a842ad8e81a306c95100
star_linsolve.py	d48a71831dd3ba433b1eced9bdf0f1dc07557a69a3140515c53404bd6f93ead3
star_linsolve-0.1.0-source.zip	9b23d6693ad6c8ef376e5d537ef2f60fba75ad240533088dba3fc7b0488f53e1

5. What it does, and its limits

Determinant, solution and inverse of a square matrix of order 1 to 20 by elimination in exact rational arithmetic, each result rounded once: conditioning costs no digit and singularity is decided exactly; equal to SymPy's exact results on all 151 systems of the cross-check, Hilbert matrices of order 6 to 12 included.

Exact arithmetic on the floats you pass: 0.1 is not one tenth, and the solution of a badly conditioned system still changes a lot when the data change a little; the answer is exact for the matrix given, not for the one you meant. A determinant returned as 0.0 can be an underflow (two entries of 1e-200 on the diagonal) and is not by itself a proof of singularity: `solve` and `inverse` decide on the exact value. Not for large systems: nothing beyond order 20, no sparse matrices, no least squares, no eigenvalues, no condition number; a 20 x 20 inverse takes about a quarter of a second on a laptop and more when the entries have many different exponents.

- `det(a)` returns the determinant, `solve(a, b)` the vector x with a x = b, `inverse(a)` the inverse, for a matrix given as a list or tuple of rows.
- The elimination is done in exact rational arithmetic on the floats given and each result is rounded once: the conditioning of the matrix costs no digit. A matrix is singular exactly when its exact determinant is zero; no tolerance is involved, so a nearly singular matrix is solved and an exactly singular one is refused.
- Measured on 151 systems (110 well conditioned, 40 badly conditioned, and the Hilbert matrix of order 3 scaled to integers): determinant, solution and inverse equal the exact rational results of SymPy rounded to a float and those of mpmath at 400 digits. NumPy agrees within 1e-12 on the well-

conditioned systems; on the badly conditioned ones it loses most digits or refuses the matrix as singular (the numbers are in the evidence file).

- Every function returns floats or raises `ValueError`: a matrix that is not square or larger than 20, entries that are not finite real numbers within 1e100 (booleans refused), a right-hand side of the wrong length, a singular matrix (for `solve` and `inverse`), a result too large for a float.

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_linsolve_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-linsolve}: Small linear systems, correctly rounded},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_linsolve/},
  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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