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# Norm1ToriHNP for GAP 4 ver.2025.07.18

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**Needs:** [GAP](#), version  $\geq 4.8.7$ ; GAP package [HAP](#), version  $\geq 1.11.15$ ;

**Current version:** [Norm1ToriHNP-2025.07.18.zip](#)

([IsMetacyclic](#) in HNP.gap was added;

Old [IsMetacyclic](#) was renamed to [IsAnySylowCyclic](#) in HNP.gap)

**Old version 4:** [Norm1ToriHNP-2024.04.03.zip](#)

([SchurCoverG](#), [MinimalStemExtensions](#), [AlwaysHNPholds](#) in HNP.gap were improved;

[AllSubgroups2](#), [StemExtensions](#) in HNP.gap were added;

[IsInvertible](#), [SearchPRowBlocks](#), [SearchP1](#), [SearchPFilterRowBlocks](#),  
[SearchPFilterRowBlocksRandomMT](#), [SearchPMergeRowBlock](#), [SearchPLinear](#),  
[SearchPBilinear](#), [SearchPQuadratic](#), [Hcandidates](#), [Norm1TorusJTransitiveGroup](#),  
[Norm1TorusJPermutationGroup](#), [Norm1TorusJCoset](#), [Norm1TorusITransitiveGroup](#),  
[Norm1TorusIPermutationGroup](#), [TransformationMatPari](#), [TransformationMatPerm](#),  
[StablyPermutationCheckHPPari](#), [StablyPermutationMCheckPPari](#),  
[StablyPermutationFCheckPPari](#), [StablyPermutationFCheckPFromBasePari](#) in  
[FlabbyResolutionFromBase.gap](#) were added as in [RatProbNorm1Tori for GAP 4 ver.2023.09.28](#);

[FlabbyResolutionNorm1TorusJ](#) in [FlabbyResolutionFromBase.gap](#) was added)

**Repository of old version 4:** KURENAI (Kyoto University Research Information Repository) <https://doi.org/10.57723/289563>

**Old version 3:** [Norm1ToriHNPver.2022.10.17.zip](#)

([AbelianInvariantsGoverH](#) in HNP.gap was added)

**Old version 2:** [Norm1ToriHNPver.2020.03.19.zip](#)

([AlwaysHNPholds](#), [KerResH3Z](#) in HNP were improved;  
[ChooseGilterator](#), [MaximalNormalSeries](#), [ConjugacyClassSubgroupsNGHOrbitRep](#),  
[ConjugacyClassesSubgroupsNGHOrbitRep](#), [MinConjugacyClassesSubgroups](#),  
[IsInvariantUnderAutG](#) in HNP were added)

**Old version 1:** [Norm1ToriHNPver.2019.10.04.zip](#)

**Contact:** [Akinari Hoshi](#), [Aiichi Yamasaki](#).

**URL:**

<http://mathweb.sc.niigata-u.ac.jp/~hoshi/Algorithm/Norm1ToriHNP/index.html>

<https://www.math.kyoto-u.ac.jp/~yamasaki/Algorithm/Norm1ToriHNP/index.html>

## Description

This code provides algorithms related to computations of total obstruction to the Hasse norm principle.

## Installation

Download [Norm1ToriHNP-2025.07.18.zip](#) and unpack it to some folder , e.g. C:\Users\*username*.

Then type "Read("HNP.gap");" on GAP.

## Documentation

FlabbyResolutionFromBase [[.html](#) [.pdf](#)]

HNP [[.html](#), [.pdf](#)]

README [[.html](#), [.pdf](#)]

## Content

```
Norm1ToriHNP-2025.07.18.zip --FlabbyResolutionFromBase.gap
                             --FlabbyResolutionFromBase.pdf
                             --FlabbyResolutionFromBasever.2018.11.05.gap
                             +-HNP.gap
                             +-HNP.pdf
                             +-HNPver.2019.10.04.gap
                             +-HNPver.2020.03.19.gap
                             +-HNPver.2022.10.17.gap
                             +-HNPver.2024.04.03.gap
                             +-README.txt
                             +-README.pdf
                             +-Norm1ToriHNP-2025.07.18.pdf
```

## References

[DP87] Yu. A. Drakokhrust, V. P. Platonov, *The Hasse norm principle for algebraic number fields*, (Russian) Izv. Akad. Nauk SSSR Ser. Mat. **50** (1986) 946-968; translation in Math. USSR-Izv. **29** (1987) 299-322.

[HKY22] A. Hoshi, K. Kanai, A. Yamsaki, *Norm one tori and Hasse norm principle*, Math. Comp. **91** (2022) 2431-2458. [AMS](#) Extended version: [arXiv:1910.01469](#).

[HKY23] A. Hoshi, K. Kanai, A. Yamsaki, *Norm one tori and Hasse norm principle, II: Degree 12 case*, J. Number Theory **244** (2023) 84-110. [ScienceDirect](#) Extended version: [arXiv:2003.08253](#).

[HKY25] A. Hoshi, K. Kanai, A. Yamsaki, *Norm one tori and Hasse norm principle, III: Degree 16 case*, J. Algebra **666** (2025) 794-820. [ScienceDirect](#) Extended version: [arXiv:2404.01362](#).

[HKY] A. Hoshi, K. Kanai, A. Yamsaki, *Hasse norm principle for  $M_{11}$  and  $J_1$  extensions*, [arXiv:2210.09119](#).

[HY] A. Hoshi, A. Yamasaki, *Hasse norm principle for metacyclic extensions with trivial Schur multiplier*, [arXiv:2503.14365](#).

Norm1ToriHNP is a free software.

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