Universität Zürich
Institut für Informatik

HS 2022

Student Name:
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Numerical Methods in Informatics - Exercise 3

Hand out: 02.11.2022 - Due to: 15.11.2022

Please upload your solutions to the Olat system.

Practice

3.1 Bases

a) (10 Min, 5 Points) Basis Change

Please implement the function `changeBase(sourceBase, targetBase)` in `backend.py`. The function is supposed to create and return a matrix which maps any vector represented with respect to the `sourceBase` into the `targetBase`. Both bases are given as a list of numpy vectors.

Hints: You are allowed to use np.linalg.inv to calculate the inverse

b) (10 Min, 5 Points) Subspaces

Please implement the function `spansSubSpace(base, subBase)` in `backend.py`. The function is supposed to determine whether a given subBase spans a subspace of the given base and return `True` or `False`. Both bases are given as lists of numpy vectors.

Hints: Check the link: https://math.stackexchange.com/questions/4303127/determining-if-a-given-subbase-s-spans-a-subspace-of-the-given-base-b

- You are allowed to use np.linalg.matrix_rank, if you want to calculate the rank for some reason.

- You are allowed to use np.linalg.lstsq(..., ..., rcond=None), if you want to use a least-square solution for some reason.

Handing in:

Please only include your `backend.py` in your hand in.