Mathematisch-Naturwissenschaftliche Fakultät
Institut für Informatik, Anja Rey

Exercise Sheet 4

for the lecture on

Advanced Programming and Algorithms

Submission until **Monday, 13th November, 12:30 pm**.
Discussion in the exercise classes on 20th, 21st and 24th November, 2023.

Problem 1 to hand in: *Algorithm Example*

Write an algorithm for the following problem:

Given a positive integer n, return a list that contains all prime numbers p with distance 1 to a power of two, $2 \leq p \leq n$.

a) Provide a representative test example.

b) Describe an algorithm that solves this problem intuitively.

c) Formulate the algorithm in Pseudocode. For a better learning effect, use as few Python-specific functions as possible.

d) Analyse the asymptotic worst-case running time of your algorithm.

e) Provide a proof sketch that the algorithm is correct.

f) Implement your algorithm and optimise it in terms of readability. Does this change the asymptotic running time?

Problem 2 for discussion: *tba*