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**Approximation Algorithms**  
**Exercise 4**  
**June 2, 2021**

Please hand in your solutions until June 16, 11:30 am by e-mail to `keldenich@ibr.cs.tu-bs.de`.

**Exercise 1 (Covering PTAS):**

In the lecture you have seen a PTAS for packing  $2 \times 2$  squares into a polyomino. Provide a PTAS for covering a polyomino by  $2 \times 2$  squares and prove its correctness. You can simply adapt the packing PTAS. **(20 P.)**

**Exercise 2 (Greedy Packing of Squares into a Polyomino):**

Consider an algorithm that packs  $k \times k$ -squares into a polyomino in a greedy fashion by simply packing a square as high and as far to the left as possible, until no further square can be packed. Show that this algorithm is a  $\frac{1}{4}$ -approximation algorithm for packing the maximum number of  $k \times k$ -squares into a polyomino. **(10 P.)**