

Assignment 1: Problem 4

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1 Notation

Zero or first unary natural number: 0 Successor of n : $s(n)$ Multiple successor operations: $sss(n)$, equals to the successor of the successor of the successor of n .

2 Solution

Let P_1, P_2, \dots, P_n arbitrary convex polygons.

Base Case

We assume the following:

- P_1, P_2, P_3 have a common edge.
- P_2, P_3, P_4 have a common edge.

Then P_1, P_2, P_3, P_4 have a common edge. Since P_2, P_3 are in both cases.

Step Case

Prove the property holds for $P_{s(n)}$

- $P_n, P_{s(n)}, P_{ss(n)}$ have a common edge.
- $P_{s(n)}, P_{ss(n)}, P_{sss(n)}$ have a common edge.

$P_n, P_{s(n)}, P_{ss(n)}$ have a common edge with all the polygons. $P_{s(n)}, P_{ss(n)}$ appear in both sets, so $P_{s(n)}, P_{ss(n)}, P_{sss(n)}$ should also have a common point with all the polygons.