

ANNA'S CONJECTURE: MAXIMAL BODIES ON KAYAKS

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1. INTRODUCTION

On Sunday, 3rd of February 2019, Anna conjectured that it would be possible to have 5 people on a Cobra Tandem kayak. With the help of Boris Lishak, Bregje Pauwels, Carol Badre, Jesse Burke, Valentin Romanov and Yossi Bokor, Anna managed to prove the conjecture later in the afternoon. Initially, Anna proposed the conjecture whilst on the Kayak with Boris. In the next section, we will introduce the conjecture and provide the proof.



FIGURE 1. A Cobra Tandem Kayak, image sourced from <http://www.cobrakayaks.com/recreational-kayaks/surf-and-fun/>

We now introduce some notation. Given $m \in \mathbb{N}$, we let

$$\mathbb{N}_m := \{n \in \mathbb{N} \mid 0 \leq n \leq m\}.$$

2. THE CONJECTURE

We will first state the conjecture, and then go through the proof, highlighting the difficulties.

Theorem 1. *For $n \in \mathbb{N}_5$, it is possible to have n people on a Cobra Tandem kayak and paddle it.*

Before we begin the proof, we outline the process used. At one stage, it appeared that the conjecture would only be true for $n \in \mathbb{N}_2$. This difficulty was overcome, and the $n = 3, 4$ cases were shown.

Proof. We will prove the conjecture via a form of induction. The case $n = 0$ is clear: simply place the kayak on the water, and it floats. For $n = 1$, Anna simply sat on the kayak, and then for $n = 2$, Boris joined.

This is where the difficulties in the proof begin, for $n = 3$. The first attempt to prove the $n = 3$ case went as follows. Val and Yossi were on the kayak, and Boris insisted on joining. Each attempt to get Boris on ended up throwing Boris, Val and Yossi off the kayak, and so we thought the conjecture was false. After some

careful thought, Yossi had an idea for a potential method. To achieve the $n = 5$ case, the order and placement for people to get on the kayak needed to be careful and strategic. To begin, Anna got on the kayak and sat on the very front, whilst Yossi stabilised the rear. After this, Carol got on and sat behind Anna, and then Val sat behind Carol. The final two steps were the most difficult. Boris successfully got on the kayak behind Val. Then final step was for Yossi to get on. This was achieved by Yossi getting on from the rear. Having achieved getting everyone on the kayak, the next step was to begin to paddle, which was achieved with some careful coordination of limbs and paddles.



FIGURE 2. $n = 5$ people on a Cobra Tandem Kayak.

□

3. CONCLUSION

Whilst at certain points in the day, Anna's Conjecture appeared to be false, with careful planning and coordination we managed to prove the conjecture.



FIGURE 3. Us.