

Homework 19: Presentations (Kayla, Declan, and Ziming)

*Due Friday, week 9**UCSB 2014*

Do **two** of the **three** problems below!

1. (Ziming) For what values of n can I find a number that is congruent to $k \pmod{k+1}$, for every k between 1 and n ? When this is possible, what is the smallest number with these properties?
2. (Kayla) Prove the “orthogonal spaceship” theorem mentioned at the end of Kayla’s talk: that any spaceship that moves along one of the four axes of the plane needs at least $2n$ timesteps to move n units in space.
3. (Declan) Can you design an envy-free algorithm for 3 players?

Hint: look at

<http://www.math.hmc.edu/su/papers.dir/rent.pdf>,

because (1) it’s an amazing paper and (2) it’s relevant here!