## PROBLEM OF THE WEEK - FALL 2014 - WEEK OF 12.1.14

## FINAL QUESTION

Let *n* runners begin a race at the same time and position on a unit length circular track. Assume the runners all have constant speed and that all of their speeds are distinct: no two runners are running at the same speed. Let's call a runner isolated at time *t* if they are at least  $1/n^{\text{th}}$  the length of the track from every other runner at that moment.

**Claim:** Each runner has a time where they are isolated. [Note: They are not necessarily all isolated at the same time.]

The claim is vacuous for n = 1. So,

- Show the claim holds for n = 2.
- Show the claim holds for n = 3.
- How many runners can you show the claim holds true for?

