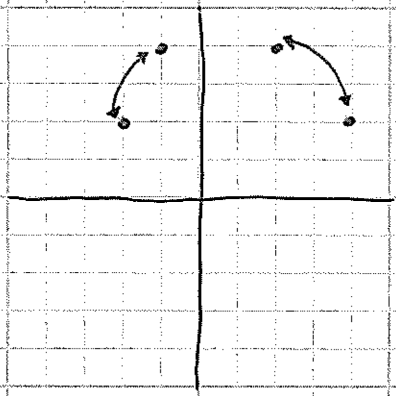
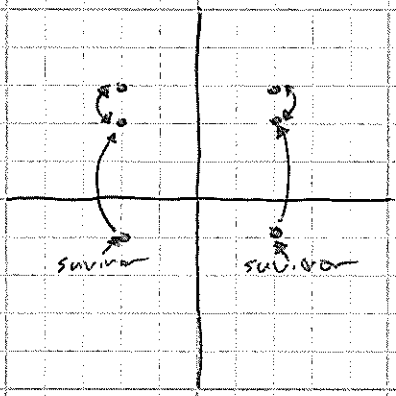
1)



2)



3) Base Case $n = 3$

We have the people $\{a, b, c\}$. Every one has a unique nearest neighbour so the situation where

$$\left.\begin{array}{l} a \text{ throws at } b \\ b \text{ throws at } c \\ c \text{ throws at } a \end{array}\right\} \text{or some rearrangement of this case.}$$

So $\therefore$ there must be a pair that throw pies at eachother making the third a survivor

Induction Step: assume holds for all odd numbers $< n$ (where n is odd) show it holds for $n+2$

Let P be the set of people

By the same argument in base case we cant have a ring of people that pie each other because everyone has a unique nearest neighbour. $\therefore$ there must be a ~~to~~ pair of people who pie each other.

Let $\{x, y\}$ be ~~the~~ a pair of people who pie each other

Now consider $P \setminus \{x, y\}$

$|P \setminus \{x, y\}| = n$, an odd number: we know there is a survivor for a pie problem of size n. Let this person be S.

Now we add the pair $\{x, y\}$ back in, as they pie each other they dont effect who the survivor.

$\therefore S$ is still the survivor for the set of people P

4) This isnt true as we can see by the folowing exemple. (a, b) is the ~~furthest~~ pair furthest apart but nether survive.

5) No, the folowing example disprouves this. A and b throw pies the furthest and nether survive