6 Mistakes in induction proofs

6.1

The induction hypothesis implies that all groups are the size k, and in the induction step it says that both group L and F are the same size k, but group L should be the size k+1. It also assumes that the presence of a common person between F and L guarantee that all members of a larger group share the same name which is wrong.

6.2

First, they turn $\frac{1}{n(n+1)}$ Into $\frac{1}{(k-1)K}$ which is not possible, and when they add $\frac{1}{k(k+1)}$ it should be $\frac{1}{(k+1)((k+1)+1)}$.