

I will demonstrate the type of solution I am looking for in assignments. To do so, we shall consider a variation of the Heap of Beans game. Instead of 16 beans, let's suppose there are 9 beans and that each turn consists of removing 1 or 2 beans from the pile.

Solution.

Insert description of game rules here

In the Heap of Beans game there is a strategy to ensure that you will always win. The strategy can be broken down into two parts. The first part is to go second. The second part is to make sure the total number of beans in the pile after each round is a multiple of 3. To see this, we can simplify the game into 3 games of 3; i.e., consider playing the game with 3 beans in the pile 3 times. If one wins each of these separate games, he will win the game of 9 beans because at the last 3 bean game, he will remove the remaining beans. Therefore, we need only consider one game of 3 beans. We note that after the first player goes, there is at least 1 bean left in the pile since $3-2=1$, $3-1=2$. Therefore, the second player will always take the last bean.