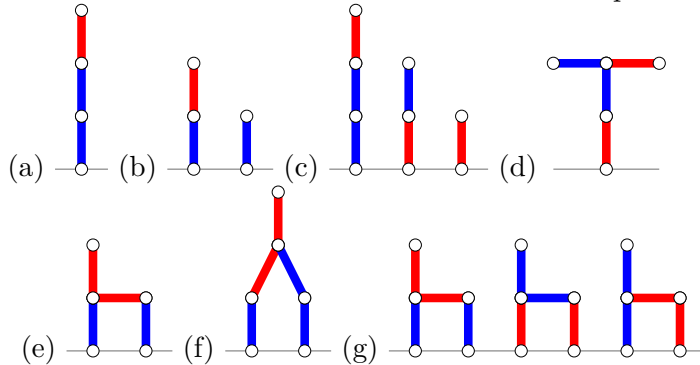
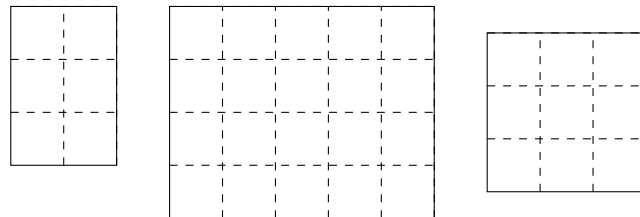


## Worksheet 2: Hackenbush

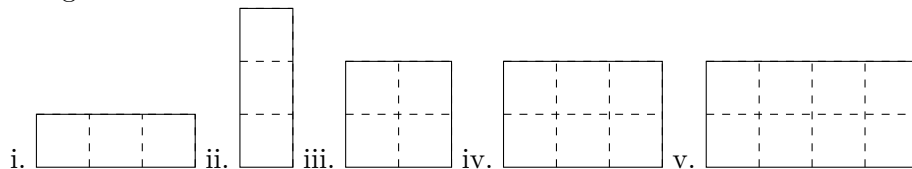
1. Determine the number for these **Hackenbush** positions.



2. **Cutcake**: Left and Right have decided to play a game while dividing up a tray of biscuits which have been scored in a grid but not cut. Left will cut any rectangle into two smaller ones along one of the North-South lines, and Right will cut any rectangle along an East-West line. The first player who cannot move loses. Some example starting positions are shown below.

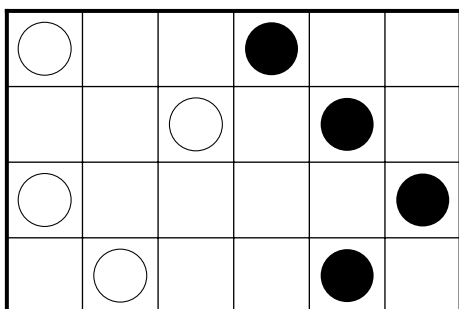


- (a) Play **Cutcake**, apply the problem-solving advice and try to think of optimal strategies.  
 (b) Explore some simple **Cutcake** positions. Try analysing these positions. Can you score them using the methods we used for Hackenbush?



3. **Northcott's Game**. A rectangular grid has a black token and a white token in each row. Each turn a player must move a piece of their colour any number of spaces along the row without jumping over the other piece. The player who makes the last possible move is the winner.

An example starting position is shown below. Play and analyse Northcott's game using the ideas from this section of the module.



Note: is this a partizan game or an impartial one?