Question 2:

1. There will be (m x n) – k tiles in general in a (m, n, k) puzzle. M x n is the number of total possible tiles then we subtract k tiles for empty squares.

2. (m x n)!/k amount of distinct state spaces. I found this by counting the number of unique state spaces in a (2, 2, 1) puzzle. For a (2, 2, 1) puzzle there are 4 x 3 x 2 possible states. If there is a (2,2,2) puzzle there will then be 4 x 3 x 2 / 2 possible states. For each tile, there are (m x n) x (m x n -1) possible combinations for all other tiles.

3.