

2. (a) #tiles = $m \cdot n - k$

(b) $\begin{bmatrix} 1 & 2 \end{bmatrix}$ $\begin{bmatrix} 2 & 1 \end{bmatrix}$

2-tiles \Rightarrow 2 states

$(1, 2, 3)$ $(1, 3, 2)$ $(3, 2, 1)$ 3-tiles \Rightarrow 6 states
 $(2, 1, 3)$ $(3, 1, 2)$
 $(2, 3, 1)$

$$4 \times 3 \times 2 \times 1 = 4!$$

4-states \Rightarrow 24 states

= 24 possible states

(assuming each tile is unique)

(c) Let 0 denote the empty tile: starting state = $\begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$

