

# The missionaries and cannibals problem

- $N$  missionaries and  $N$  cannibals are at the left bank of a river
- There is a boat that can hold  $K$  people
- Find a way to get everyone to the right bank
- So that at any time, at any place (on either bank, or in the boat),  $\# \text{missionaries} \geq \# \text{cannibals}$  or  $\# \text{missionaries} = 0$

# Formulation of the MC problem

- States  $(M, C, B)$  where  $M$  – #missionaries,  $C$  – #cannibals at the left bank,  $B = 1$  indicates the boat is at the left bank
- Actions  $(m, c)$  where  $m$  – #missionaries,  $c$  – #cannibals on the boat
- Precondition: #missionaries and #cannibals satisfy the constraint
- Effects:  $(M, C, 1) \xrightarrow{(m,c)} (M - m, C - c, 0)$  and  $(M, C, 0) \xrightarrow{(m,c)} (M + m, C + c, 1)$

# Exercise

Running breadth-first with cycle-checking for  $N = 3$  and  $K = 2$