**The problem**

Missionaries and Cannibals is a problem where you initially have 3 missionaries, 3 cannibals and a boat on one side of a river. The goal is to move all cannibals and missionaries to the other side of the river given some rules:

* If any side of the river has more cannibals than missionaries, you loose. The cannibals have a meat fest!
* The boat only moves if it has one or two passengers, you can choose who’s on it. The boat doesn’t move without anyone on it.

### **Start and finish states**

The problem has an initial state where everyone is on the East side of the river and we reach a solution when everyone is on the West side of the river.

start([3,3,0,0,east]).

goal([0,0,3,3,west]).

### **Changing states**

It’s not hard to see that the state changes when the boat takes passengers across the river. There are 5 possible moves:

* 2 Cannibals
* 2 Missionaries
* 1 Cannibal
* 1 Missionary
* 1 Cannibal, 1 Missionary

### **Valid states**

A new state is valid if:

* there are missionaries present on a given side of the river, there cannot be more cannibals than missionaries.
* the number of missionaries and cannibals on any given side has to be positive.

**Legal States:**

legal(CL,ML,CR,MR) :-

% is this state a legal one?

ML>=0, CL>=0, MR>=0, CR>=0,

(ML>=CL ; ML=0),

(MR>=CR ; MR=0).

**Possible moves:**

move([CL,ML,CR,MR,east],[CL,ML2,CR,MR2,west]):-

% Two missionaries cross east to west.

MR2 is MR+2,

ML2 is ML-2,

legal(CL,ML2,CR,MR2).

**Solution found:**

path([CL,ML,CR,MR,B],[CL,ML,CR,MR,B],\_,MovesList):-

output(MovesList).

**Printing Output:**

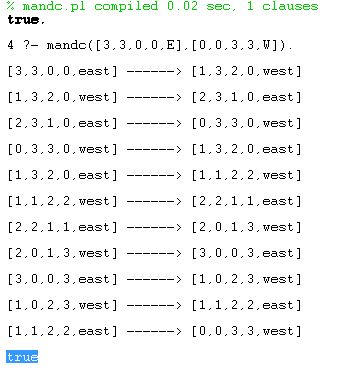
output([]) :- nl.

output([[A,B]|MovesList]) :-

output(MovesList),

write(B), write(' ------> '), write(A), nl,nl.

**Output:**

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