Worksheet 1

📄 Farmer-Fox-Chicken...

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Working with State Spaces

The Farmer-Fox-Chicken-and-Grain Problem:

A farmer needs to take a fox, chicken and sack of grain across a river using a small boat. He can only take one of the three items in the boat with him at one time. The fox must never be left alone with the chicken, and the chicken must never be left alone with the grain. How can he get everything across the river?

(a) Describe the initial state for this problem*. Assume they start on the left bank of the river and must get to the right bank.

RFCG - 0   R: farmer   F: fox   C: chicken

G : sack of grain

(b) List a sufficient set of operators for the problem.

O_1 . farmer cross by himself

O_2: farmer cross with fox   precondition: fox is with chicken or by itself

O_3: farmer cross with chicken   Precondition: chicken with grain or by itself or with fox

O_4: farmer cross with sack of grain   precondition: chicken w/ grain or by itself

(c) How many states are there in the state space?

16 possible, 6 violate constraints

(d) Draw the problem-space graph*.

(e) Highlight a solution path on the graph.

*Suggestion: represent each state by listing the initials of the items on the left bank. For example "Ffg" means the Farmer, fox, and grain are on the left bank (and the chicken is therefore on the right bank). If you draw the initial state on the left, you could use "number of operator applications from initial state" as the x coordinate for the layout (for the layout, pretend that the fox never eats the chicken, and the chicken never eats the grain. You can draw all the states, put a dotted oval around any "illegal state" (a state in which the fox would eat the chicken or the chicken would eat the grain).

Who were your groupmates for this activity? Write down their names and email addresses:

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