CSE 415, Univ. of Wash. Last name:_____ First name: _____

Working with State Spaces (SOLUTIONS)

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?

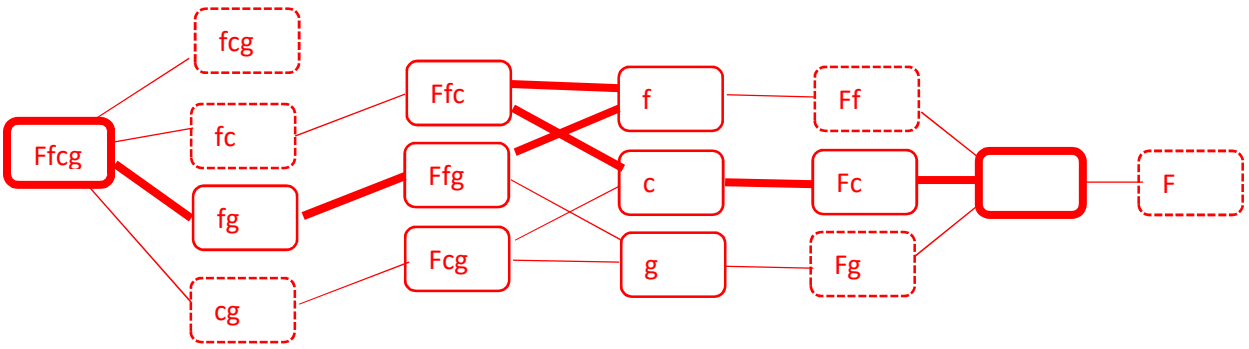
(a) Describe the initial state for this problem*. Assume they start on the left bank of the river and must get to the right bank. All are on the left bank: "Ffcg"

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

{Farmer crosses alone, Farmer crosses with fox, Farmer crosses with chicken, Farmer crosses with grain}

(c) How many states are there in the state space? 16, because each of the four items can be either on the left bank or the right bank. 2 x 2 x 2 x 2 = 16. (Some of these states must be avoided, however. These have dotted outlines in the graph below.)

(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).

provided by S. Tanimoto, 2018