# Assignment 1

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## 1 Part A - Three People Crossing

Three art collectors, Alice, Bob and Carol are on the western bank of a river and want to get across. Each has recently purchased an artwork. Alice has a painting worth $20 000, Bob has a vase worth $12 000, and Carol has a sculpture worth $8 000. The only boat has a capacity of two people, or one person and an artwork. They don't trust each other, but agree on a plan of travel such that the people in any particular location are never with art that is worth more than they collectively own.

### 1.a Notation

To illustrate this problem we will use A, B, and C to represent Alice, Bob, and Carol respectively. The art work will be represented by the total value in that area. For example, if BC are together on one section of the bank, the notation will be BC - $32,000. To represent the river as a whole we will use two square braces " [ ] ". Left of this first square brace will represent the left bank and to the right of the second will be the right bank. In between will represent the river and signify that anything in between the braces must be on the boat.

### 1.b Initial & Goal State

With this notation established, the initial state will be:
ABC - $40,000 [ ] and the goal state:
. [ ] ABC - $40,000

### 1.c Allowable States

The allowable states are as follows:

### 1.d Solution

### 1.e Additional People

Just as everyone gets to the eastern bank, Dave and Elisha arrive on the western bank wanting to cross. Dave has a statue worth $15000 and Elisha has glassware worth $7000.

With these new additions, C must be sent back because if anyone else is sent C will be left with artwork that has a higher value then the art she collectively owns.

### 1.f Invariant

## 2 Part B - String Substitutions

Fred has a text file containing a string, for each move he can make any of the following substitutions: 1. B with AAA 2. AC with AAAA 3. AAA with BC 4. AAAAAB with AA

### 2.a

### 2.b

### 2.c

## 3 Part C - Big__ Terms