1. (a) (1) We can represent a states as a 2-tuple (ordered pair) whose first element represents the amt. of water in Three & whose second " " " " Four.

∴ The initial state is (0, 0).

(2) The goal condition, expressed as a test on an ordered pair, is:

```
FUNC isGoal ((x,y)):
    if (y == 2)
        return True
    else
        return False.
```

(3) The operators on states are as follows:

(i) DrainThree : pour the contents of Three into D [DT]
changes (x,y) to (0, y).

(ii) DrainFour : pour the contents of Four into D [DF]
changes (x,y) to (x, 0).

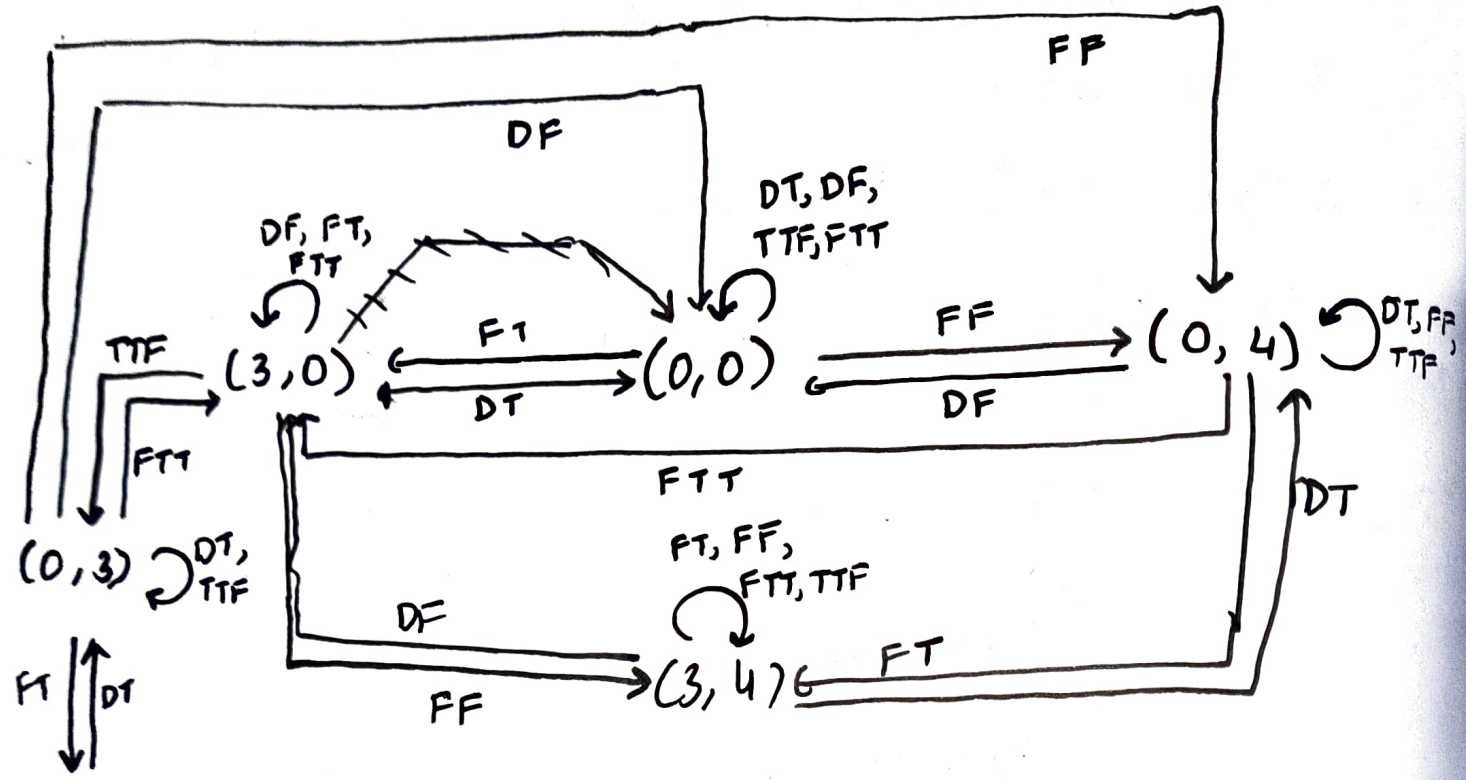
(iii) FillThree : pour from T to Three until full [FT]
changes (x,y) to (3, y)

(iv) FillFour : pour from T to Four until full [FF]
changes (x,y) to (x, 4)

(v) ThreeToFour : pour from Three to Four [TTF]
changes (x,y) to $(x+y-4, 4)$ if $x+y \geq 4$
$(0, x+y)$ o/w.
$\equiv (\max(x+y-4, 0), \min(4, x+y))$

(vi) FourToThree : pour from Four to Three [FTT]
changes (x,y) to $(3, x+y-3)$ if $x+y \geq 3$
$(x+y, 0)$ o/w
$\equiv (\min(3, x+y), \max(x+y-3, 0))$

(b)



(Path To Goal)