Assignment 3

Name: Jayesh Parsnane
ID : 1001964955

Q1)

i) Taller(x, john); Taller(Bob, y)

Replacing x with bob & y with john we can create an equivalence.

$\Rightarrow \{x/Bob, y/john\}$

ii) Taller(y, Mother(x)); Taller(Bob, Mother(Bob))

~~Mgu unifier does not exist even if we substitute anything because function mother will return different value depending on whichever variable gets passed into [illegible]~~

$\rightarrow \{x / Mother, Bob\}$

iii) Taller(Sam, Mary); Shorter(x, Sam)

No unifier exists for the predicates because the variable will not have same value for bothe the predicates (Sam).

iv) Shorter (x, Bob); Shorter (y, z)

Both predicate share no common variable so no unification is possible

⇒ { } empty set.

v) Shorter (Bob, John); Shorter (x, May)

Both predicate share no common variable so no unification is possible

⇒ { } empty set

Task 2)

constants

(ADULT A1)

(ADULT A2)

(CHILD C1)

(CHILD C2)

(LOCATION L)

(LOCATION R)

(BOAT B)

Initial state:

Everyone is on the leftside of the river.

(on (A1, L) And (on (A2, L) And on (C1, L) And on (C2, L) And on (B, L)

Goal state:

on (A1, R) And on (A2, R) And (on (C1, R) And on (C2, R)

(Operator moveadult
(param
(<a> adult)
(<L1> location)
(<L2> location))
(precond
on (<a>, <L1>) And on (B, <L1>))
(effects
on (<a>, <L2>) And on (<B>, <L2>) And
del on (<a>, <L1>) And del(on(B, <L1>)))

(Operator movechildren
(Param
(<a1> child)
(<a2> child)
(<L1> Location)
(<L2> Location))
(Precond
on(<a1> <L1>) And on(<a2> <L1>) And
on (<B> , <L1>))
(effects
on(<a1>, <L2>) And on(<a2>, <L2>) And
on (B, <L2>) And del on(<a1>, <L1>)
And del on (<a2>, <L1>) And
del on (B, <L1>)))

(Operator movechild
(Param
(<a> child)
(<L1> location)
(<L2> location))
(Precond
on (<a>, <L1>) And on (B, <L1>))
(effects
on (<a>, <L2>) And on (B, <L2>) And
del on(<a>, <L1>) And den on(B, <L1>)))

Task 3

Predicates = 3
constant = 5
Each predicate take 4 arguments

Predicate with 1 argument = $3 \times 5^1 = 15$
Predicate with 4 argument: $3 \times 5^4 = 1875$

Total number of ways to assign all the constants =

[min no. of pddl states, max of pddl states]

= [15, 1875]

Tight bound on the no of unique state in the jungle world

= [15, 1875]

Task 4:

for online Replanning, there is no need for any modifications as it would replan the whole senario. If goal of an action is not achieved, then system will replans the flow again from the current state.

for conditional planning or contingent planning, following are the to be modified actions.

→ (Operator movecadult
(Param
(<a> Adult)
(<L1> Location)
(<L2> location))
(Precond
(on (<a>, <L1>) And on (B, <L1>))
(effects
(on (<a>, <L2>) And on (B, <L2>) And
del on (<a>, <L1>) And del on (B, <L1>))
OR (TRUE))

(Operator movechild
(Param
(<a> child)
(<l1> location)
(<l2> location))
(Precond
on (<a>, <l1>) And on (B, <l1>))

(effects
(on (<a>, <l2>) And on (B, <l2>)
And del on (<a>, <l1>) And
del on (B, <l1>)) OR (TRUE))