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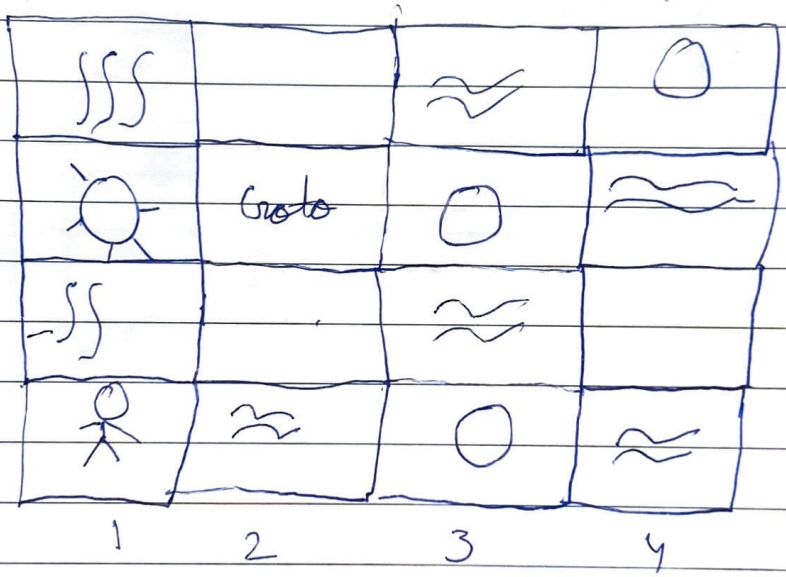
A.I Assignment

Q1) Check whether moving the agent to the following position are safe or not?
(1, 2), (3, 1), (2, 1), (2, 2)

Q2) Both way to win the gold calculate the reward points.

Ans 1)



✓ ✗ ✓ ✓

① given (1,2) (3,1) (2,1) (2,2)

(1,1) → (1,2), (2,1). {breeze (safe).
(2,2) → (2,2) → ? (Breze) (2,2 is (safe)
(3,1) → ? (unsafe)
(1,2) → (switch) → (1,3)
→ (2,2) free (safe)
(2,2) → safe → (3,2) (safe) (breeze)
→ (2,3), (gold)

② (1,1) → (2,1) → (1,1) → (1,2) → (2,2) → (2,3)
(1,1) → (1,2) → (2,2) → (2,3)
-1 -1 -1 +1000 = 997 -1 -1 -1 -1 +1000 = 995

Q3)

Ans3) Nadhi eats a fruit → It is an apple.
$F \rightarrow A$

2. Nadhi eats a fruit only if it is an apple.
$F \rightarrow A$

3. Nadhi eats a fruit if and only if it is an apple
$F \leftrightarrow A$.

Q4)

Ans4) ~~ε lion~~

a) $\varepsilon \rightarrow H$ translates to "If E-lion is eating, then H-lion is hungry".

b) $(\varepsilon \wedge \neg H)$ translates to "ε-lion is eating and H-lion is not hungry".

c) $\neg (H \wedge \varepsilon)$ translates to "It is not the case that H lion is hungry and ε-lion is eating".

Q5)

Ans 5)

a) Everyone who walks is calm.
Let $W(x)$ represents "x walks" and $C(x)$ represents "x is calm".
The statement can be translated as
$\forall x (W(x) \rightarrow C(x))$.

b) If anyone cheats, he suffers. Let $C(x)$ represents "x cheats" and $S(x)$ represent "x suffers".
The statement can be translated as:
$\exists x (C(x) \rightarrow S(x))$.

c Everyone loves Mary.
Let $L(x, y)$ represent "x loves y", where x represents

a person and y represents Mary.
The statement can be translated as:
$\forall x\, L(x, Mary)$.

Q 6):

Ans. 6) Let's determine whether the expressions are unifiable and find the most general unifier:

a) Unify "likes (John, Mary)" with "likes (John, Sarah)".
- These expressions are unifiable.
- Most general unifier: {Mary/Sarah}

b) Unify "livesin (John, city (x))" with "livesin (Sarah, city (London))".
- These expressions are unifiable.
- Most general unifier: {John/Sarah, x/London}

c) Unify "owns (carol, car (x))" with "owns (carol, car (Toyota))".
- These expressions are unifiable.
- Most general unifier: {x/Toyota}

d) Unify "works at (Employee (x), company (y))" with "works at (Employee (John), company (company A))".
- These expressions are unifiable.
- Most general unifier: {x/John, y/company A}

Q 7)

Ans) S(x): x is a student.
F(x): x takes French
G(x): x takes greek
P(x): x passes the course
T(x): x took the course in Spring 2001.
B(x, y): x scored better than y.

a) Some students took French in Spring 2001
$\exists x (S(x) \wedge F(x) \wedge Y(x, \text{Spring 2001}))$

b) Every student who takes French passes it.
$\forall x ((S(x) \wedge F(x)) \rightarrow P(x))$

c) only one student took Greek in spring 2001.
$\exists x (x(x) \wedge G(x) \wedge Y(x, \text{Spring 2001})) \wedge \neg \exists$

d) The best score in Greek is always higher than the best score in French.
$\forall x \forall y ((U(x) \wedge G(y) \wedge B(x, y)) \rightarrow \exists z (F(z)$

Q 8)

Ans 8) $P \Leftrightarrow (Q \wedge \neg R)$ becomes
$(P \vee \neg Q \vee R) \wedge (\neg P \vee Q) \wedge (\neg P \vee R)$

$W \Rightarrow F$ becomes $\neg W \vee F$.

$R \Leftrightarrow S$ becomes
$(R \vee \neg S) \wedge (\neg R \vee S)$.

$S \Rightarrow P$ becomes $\neg S \vee P$.

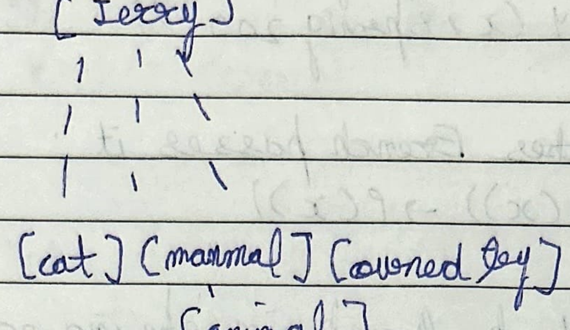
$P \Rightarrow (\neg (Q \vee W) \vee S)$ becomes $\neg P \vee \neg Q \vee S$ and $\neg P \vee \neg W \vee S$

so in clausal form:

a) $(P \vee \neg Q \vee R) \wedge (\neg P \vee Q) \wedge (\neg P \vee R)$
b) $\neg W \vee F$)
c) $(R \vee \neg S) \wedge (\neg R \vee S)$
d) $\neg S \vee F$
e) $\neg P \vee \neg Q \vee S$ and $\neg P \vee \neg W \vee S$

Q 11)

Ans 11)



Frame:

Entity : Jerry
Type : cat
Color : Brown
owner : ~~Bro~~ Priya

Entity : cat
Type : Mammal

Entity : Mammal
- Type : Animal

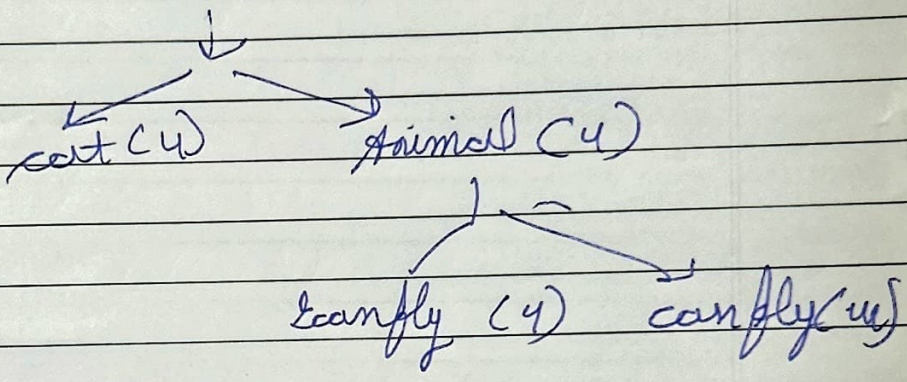
Entity : Animal
Type : -

(4).

State → 1
$\neg$ cat (u) Animal (u).
State → 2
$\neg$ Animal (u) $\vee$ $\neg$ can fly (u)
Statement (no cats can fly)
$\neg$ ($\forall$u) (cat (u) → can fly (u))
Negation ($\exists$ x) (cat (u) $\wedge$ → can fly (u))
cat (u) $\wedge$ $\neg$ can fly (u)

resolutions

4) ¬ cat(v) ∨ Animal(4),
¬ Animal (4) ∨ ¬ can fly (4)
cat (4)
¬ can fly (4) 4
resolved statement : 2 , ¬ can fly (4) 3
¬ cat (v) ∨ Animal (4)



contradiction :