# ASSIGNMENT 6

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## Problem 1

```
CHECK_EQUIVALENCE (KB1, KB2)
{
    return CHECK_IMPLIES (KB1, KB2) &&
        CHECK_IMPLIES (KB2, KB1);
}
CHECK_IMPLIES (KB1, KB2)
{
    return OREXP (NOTEXP (KB1), KB2);
}
NOTEXP (KB)
{ return !KB }
OREXP (KB1, KB2) {
return KB1 || KB2; }
```

## Problem 2

Part a : Yes, KB entails S1 because whenever KB is true, S1 is also true

Part b : No, NOT (KB) doesn't entail NOT (S1) since for all values when NOT (KB) is true, NOT (S1) is not true for all.

## Problem 3

First case :

A true, B true, C true, D true

Second case

A true, B ~~false~~, C true, D false

| A | B | C | D | KB |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 0 |
| 1 | 0 | 1 | 0 | 0 |

for all other combination, its true

CNF → Product of Sum

$$(\overline{A\ B\ C\ D}) \wedge (\overline{A\ \bar{B}\ C\ \bar{D}})$$

$$(\bar{A} \vee \bar{B} \vee \bar{C} \vee \bar{D}) \wedge (\bar{A} \vee B \vee \bar{C} \vee D)$$

## Problem 4

Part a:

RM → it rains on May 1, 2017

JC → John gives check to Mary on May 2nd

MM → Mary mows the lawn on 3rd May

Part b: The contract

$$(RM \rightarrow JC) \wedge (JC \rightarrow MM)$$

$$(\neg RM \vee JC) \wedge (\neg JC \vee MM) \longrightarrow (1)$$

Part B:

What truly happened:

$\neg RM \wedge JC \wedge MM \longrightarrow (2)$

Part C:

The contract was violated as (1) and (2) are not equivalent for all cases

Problem 5

(1) is_dog (Shadow)

(2) gave_dog (John, Mary)

(3) male ( is_dog (Shadow)) $\Longrightarrow$ gave_~~laptop~~ smartphone (Mary, John)

(4) female ( is_dog (Shadow)) $\Rightarrow$ gave_laptop (Mary, John)

(5) $\forall_{x \in people}$ gave_dog (John, x) $\Longrightarrow$ male (dog)

(6) gave_laptop (Mary, John) $\Longrightarrow$ female ( is_dog ( snadow))

Constants : Shadow, John, Mary

Relations : is_dog() , male() , female()

Functions : gave_dog(), gave_smartphone() , gave_laptop

P.T.O

Semantics

① Shadow is a dog
② John gave dog to Mary
③ If shadow is male, Mary gives smartphone to John
④ If shadow is female, Mary gives laptop to John.
⑤ John gives male dogs to all the people
⑥ Mary gives laptop to John if shadow is female

Problem 6

Symbols and their equivalents are :

taller_John_Bill ⇒ tall_John
taller_Bill_Bill ⇒ tall_Bill

In the knowledge Base

(taller_John_Bill ⟹ tall_John) AND
(taller_Bill_Bill ⟹ tall_Bill)