ASSIGNMENT-6: PROLOG

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Deduction Theorem

In mathematical logic, a deduction theorem is a meta theorem that justifies doing conditional proofs—to prove an implication $A \rightarrow B$, assume A as an hypothesis and then proceed to derive B in systems that do not have an explicit inference rule for this.

Given an expression, write a program to decide whether it's a theorem or not.Steps:

1. Write a parser to isolate the clauses around the implication in theexpressions

Test Cases:

1. **(P =>Q) => ((~Q => P) => Q)**

```
PS D:\IIT Patna\1st sem\AI Assignments\Assignment 6>
ts/Assignment 6/assign_6.py"
Enter an expression: (P=>Q)=>((~Q=>P)=>Q)
Result : Its a Theorem
```

2. **P => (P V Q)**

```
PS D:\IIT Patna\1st sem\AI Assignments\Assignment 6>
ts/Assignment 6/assign_6.py"
Enter an expression: (P)=>(PvQ)
Result : Its a Theorem
```

3. **(P ^ Q) => (P V R)**

```
PS D:\IIT Patna\1st sem\AI Assignments\Assignment 6>
ts/Assignment 6/assign_6.py"
Enter an expression: (P^Q)=>(PvR)
Result : Its a Theorem
```

2. Prolog Programing

Q. Write a program in Prolog to represent the following knowledge and findthe answer to the given questions

a. Knowledge

A, B and C belong to Himalayan club. Every member in the club is either a mountain climber or skier or both. A likes whatever B dislikes and dislikes whatever B likes. A likes rain and snow. No mountain climber likes rain. Every skier likes snow.

Question: Is there a member who is a mountain climber but not askier?

```
Welcome to SWI-Prolog (threaded, 64 bits, version 8.4.3)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.

For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).

?- consult("~/Desktop/PROLOG code/q2.pl").
Warning: /Users/anuragsharma/Desktop/PROLOG code/q2.pl:6:
Warning:    Singleton variables: [X]
Warning: /Users/anuragsharma/Desktop/PROLOG code/q2.pl:13:
Warning:    Singleton variables: [X]
Warning: /Users/anuragsharma/Desktop/PROLOG code/q2.pl:16:
Warning:    Singleton variables: [X]
Warning: /Users/anuragsharma/Desktop/PROLOG code/q2.pl:19:
Warning:    Singleton variables: [X]
Warning: /Users/anuragsharma/Desktop/PROLOG code/q2.pl:22:
Warning:    Singleton variables: [P,Q]
true.

?- g(a).
false.

?- g(b).
true.

?- g(c).
true.
```