Artificial Intelligence
Lab Test 2

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Program 5

```
import re

def isVar(x):
    return len(x) ==1 and x.islower()

def getAttr(str):
    expr = '\([^)]+\)'
    matches = re.findall(expr, str)
    return matches

def getPred(str):
    expr = '([a-z~]+)\([^&]+\)'
    matches = re.findall(expr, str)
    return matches

class Fact:
    def __init__(self, e):
        self.e = e
        pred, par = self.split(e)
        self.pred = pred
        self.par = par
        self.res = any(self.getConstants)
    def split(self, e):
        return [getPred(e)[0], getAttr(e)[0].strip('()').split(',') ]
    def getConstants(self):
        return [None if isVar(c) else c for c in self.par]
    def getVariables(self)
        return [v if isVar(v) else None for v in self.par]

class Implication:
    def __init__(self, e):
        self.e = e
        l = e.split('=>')
        self.lhs = [Fact(f) for f in l[0].split('&') ]
        self.rhs = Fact(l[1])
```

```
def eval(self, facts):
    c = {}
    new_lhs = [ ]
    rel = [ ]
    for f in facts:
        for val in self.lhs
            if val.pred == f.predicate:
                for i, v in enumerate(val.getVariables()):
                    if v:
                        c[v] = f.getConstants()[i]
                new_lhs.append(f)
        p, a = self.rhs.pred, self.rhs.par
    for key in c:
        if c[key]:
            a = a.replace(key, c[key]):
    expr = f'{p}{a}')
    return Fact(expr) if len(new_lhs) and all([f.res for f in new_lhs]) else None

class KB:
    def __init__(self):
        self.facts = set()
        self.implications = set()

    def tell(self, e):
        if '=>' in e:
            self.implications.add(Implication(e))
        else: self.facts.add(Fact(e))
        for i in self.implications:
            res = i.eval(self.facts)
            if res:
                self.facts.add(res)

    def display(self):
        for i, f in enumerate(set([f.exp for f in self.facts])):
            print(f'\t{i} {f}')
```

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