

## AI lab test - 2

Harsha R  
18M18CS034

29/12/20

Harsha

Question - 4

FOL to CNF

Code

```
import re
```

```
def getAttributes(s):  
    expr = '\ ([^)]+ \ )'  
    matches = re.findall(expr, s)  
    return [m for m in matches if m.isalpha()]
```

```
def getPredicates(s):  
    expr = '\ ([a-z~]+ \ ([A-Za-z]+) \ )'  
    return re.findall(expr, s)
```

```
def deMorgan (sentence):  
    string = ''  
    join(list(sentence).copy())  
    string = string.replace('~', '')  
    flag = '[' in string  
    string = string.replace('~[', '')  
    string = string.replace(']', '')  
    for p in getPredicates(string):  
        string = string.replace(p, '!' + p)  
    s = list(string)
```

(1)



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Harsha R  
IB MIRC S O 34

29/12/20  
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```

for i, c in enumerate(string):
    if c == 'v':
        s[i] = '1'
    elif c == '1':
        s[i] = 'v'
string = string.replace('~', '')
return f'[ {string} ]' if flag else string

```

```

def skolemization(sentence):
    const = [ f' {chr(c)} ' for c in range(ord('A'), ord('Z')+1)]
    statement = ' '.join(list(sentence).copy())
    matches = re.findall('[V\exists]', statement)
    for match in matches[1:-1]:
        statement = statement.replace(match, const.pop(0))
    for predicate in getPredicates(statement):
        attributes = getAttributes(predicate)
        if ' '.join(attributes).islower():
            statement = statement.replace(
                match[1], const.pop(0))
        else:
            aL = [ a for a in attributes if a.islower() ]
            aU = [ a for a in attributes if not a.islower() ]

```

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```

statement = statement.replace(aV, '(' + cont.pop() +
    aL[0] if len(L) else match[i])
return statement

```

```

def fol_to_inf(fol):
    statement = fol.replace('<=>', '-')
    while '-' in statement:
        i = statement.index('-')
        new_statement = statement[:i] + '=' + statement[i+1:]
        statement = statement[:i+1] + statement[i+1:]
        statement = new_statement
    statement = statement.replace('= >', '-')
    expel = '\([^\)]+\)'
    statements = re.findall(expel, statement)
    for i, s in enumerate(statements):
        if '[' in s and ']' not in s:
            statement[i] += "]"
    for s in statements:
        statement = statement.replace(s, fol_to_inf(s))
    while '=' in statement:
        i = statement.index('-')
        br = statement.index('[') if '[' in statement else 0
        (2)

```



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Harsha R  
IBM18CS034

29/12/20

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new\_statement = '~' + statement[i] + new\_statement

if i > 0 else new\_statement

while '~V' in statement:

i = statement.index('~V')

statement = list(statement)

statement[i], statement[i+1], statement[i+2] =

'F', statement[i+2], '~'

statement.pop = statement

statement = ''.join(statement)

while '~F' in statement:

i = statement.index('~F')

s = list(statement)

s[i], s[i+1], s[i+2] = 'V', s[i+2], '~'

statement = ''.join(s)

statement = statement.replace('~V', '[~V]')

statement = statement.replace('~F', '[~F]')

exp1 = '(' + '[~V|~F]' + ')'

statements = re.findall(exp1, statement)

for s in statements:

statements = statement.replace(s, 'to be ing(s)')

exp1 = '~\[[^\]]+\]'

statements = re.findall(exp1, statements)

for s in statements:

statement = statement.replace(s, remove(s))

return statement

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AI lab test - 2

Kaisha R  
1BM18CS035

29/12/20

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```
sol = input("Enter pol statement: ")
```

```
print
```

```
cnf = Skolemization(sol_to_cnf(sol))
```

```
print("The cnf form is: ", cnf)
```