

# **COMSATS UNVERISTY ISLAMABAD**



## **Artificial Intelligence Lab 11**

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# Activity 1:

## Code:

```
from constraint import Problem, AllDifferentConstraint

regions = ["Western Australia", "Northern Territory", "South Australia",
"Queensland", "New South Wales", "Victoria", "Tasmania"]
colors = ["red", "green", "blue"]
neighbors = [("Western Australia", "Northern Territory"), ("Western Australia",
"South Australia"), ("South Australia", "Northern Territory"),
              ("Queensland", "Northern Territory"), ("Queensland", "South
Australia"), ("Queensland", "New South Wales"),
              ("New South Wales", "South Australia"), ("Victoria", "South
Australia"), ("Victoria", "New South Wales"),
              ("Victoria", "Tasmania")]

problem = Problem()
problem.addVariables(regions, colors)
for neighbor in neighbors:
    problem.addConstraint(AllDifferentConstraint(), neighbor)
solutions = problem.getSolutions()
for solution in solutions:
    print(solution)
```

## Output:

```
@isaanahmad → /workspaces/AI-lab-manual-Solved-COMSATS-University-Islamabad (main) $ /home/codespace/.python/current/bin/python3 "/workspaces/AI-lab-manual-Solved-COMSATS-University-Islamabad/Lab 11/Activ
ty1.py"
{'South Australia': 'blue', 'New South Wales': 'green', 'Queensland': 'red', 'Northern Territory': 'green', 'Victoria': 'red', 'Western Australia': 'red', 'Tasmania': 'blue'}
{'South Australia': 'blue', 'New South Wales': 'green', 'Queensland': 'red', 'Northern Territory': 'green', 'Victoria': 'red', 'Western Australia': 'red', 'Tasmania': 'green'}
{'South Australia': 'blue', 'New South Wales': 'red', 'Queensland': 'green', 'Northern Territory': 'red', 'Victoria': 'green', 'Western Australia': 'green', 'Tasmania': 'red'}
{'South Australia': 'blue', 'New South Wales': 'red', 'Queensland': 'green', 'Northern Territory': 'red', 'Victoria': 'green', 'Western Australia': 'green', 'Tasmania': 'blue'}
{'South Australia': 'green', 'New South Wales': 'blue', 'Queensland': 'red', 'Northern Territory': 'blue', 'Victoria': 'red', 'Western Australia': 'red', 'Tasmania': 'green'}
{'South Australia': 'green', 'New South Wales': 'blue', 'Queensland': 'red', 'Northern Territory': 'blue', 'Victoria': 'red', 'Western Australia': 'red', 'Tasmania': 'blue'}
{'South Australia': 'green', 'New South Wales': 'red', 'Queensland': 'blue', 'Northern Territory': 'red', 'Victoria': 'blue', 'Western Australia': 'blue', 'Tasmania': 'red'}
{'South Australia': 'green', 'New South Wales': 'red', 'Queensland': 'blue', 'Northern Territory': 'red', 'Victoria': 'blue', 'Western Australia': 'blue', 'Tasmania': 'green'}
{'South Australia': 'red', 'New South Wales': 'green', 'Queensland': 'blue', 'Northern Territory': 'green', 'Victoria': 'blue', 'Western Australia': 'blue', 'Tasmania': 'red'}
{'South Australia': 'red', 'New South Wales': 'green', 'Queensland': 'blue', 'Northern Territory': 'green', 'Victoria': 'blue', 'Western Australia': 'blue', 'Tasmania': 'green'}
{'South Australia': 'red', 'New South Wales': 'blue', 'Queensland': 'green', 'Northern Territory': 'blue', 'Victoria': 'green', 'Western Australia': 'green', 'Tasmania': 'blue'}
```

## Activity 2:

### Code:

```
from constraint import Problem, AllDifferentConstraint

problem = Problem()

problem.addVariables(range(4), range(4))

problem.addConstraint(AllDifferentConstraint())

problem.addConstraint(lambda q1, q2, q3, q4: abs(q1 - q2) != 1 and abs(q1 - q3)
!= 2 and abs(q1 - q4) != 3 and
                                abs(q2 - q3) != 1 and abs(q2 - q4) != 2
and abs(q3 - q4) != 1,
                                (0, 1, 2, 3))

solutions = problem.getSolutions()
for solution in solutions:
    print(solution)
```

### Output:

```
● @HasaanAhmad → /workspaces/AI-lab-manual-Solved
py"
{0: 2, 1: 0, 2: 3, 3: 1}
{0: 1, 1: 3, 2: 0, 3: 2}
```