

# 6. Constraint Satisfaction Problems

## 6.1

### Australia Map-Coloring

#### Regions & Adjacencies

- WA adjacent to NT, SA
- NT adjacent to WA, SA, Q
- SA adjacent to WA, NT, Q, NSW, V
- Q adjacent to NT, SA, NSW
- NSW adjacent to SA, Q, V
- V adjacent to SA, NSW, T
- T adjacent to V only

#### Number of Valid Colorings

- **With 3 colors:** 12
- **With 4 colors:** 576
- **With 2 colors:** 0

#### Key Reasoning

1. Once you assign colors to WA, NT, and SA, the rest of the map is mostly forced (for 3 or 4 colors).
2. With 2 colors, SA's many adjacencies make a proper coloring impossible.