# CS 520: Introduction to Artificial Intelligence

**Prof. Louis Steinberg**

**Lecture 5:**

**Game playing**



# Review: Constraint Satisfaction

- **Given:**
  - **A set of variables: x1 … xn**
  - **A finite domain of values for each variable: D1 …Dn**
  - **A set of constraints: C1 … Cm**
- **Find: An assignment of values to variables that satisfies the constraints.**

# Review

- **Examples of Constraint Satisfaction Problems**
  - **N-Queens.**
  - **House Floorplanning.**
  - **Job scheduling.**
  - **Crypt-Arithmetic.**
  - **Scene Labeling.**
  - **VLSI Layout and routing.**
  - **Graph Coloring.**
  - **Bin Packing.**
- **Arity**



# Review

**Constraint propagation**

- **Remove values from domain that are ruled out by constraints**
  - **Constraint: A > B**
  - **Domains: A: {3, 5, 7}, B: {4, 6, 8}**
  - **Arc consistency: A: {5, 7}, B: {4, 6}**
- **Full propagation can be multi-step**
  - **Constraints: A > B, B > C**
  - **Domains: A: {3, 5, 7}, B: {4, 6, 8}, C:{5, 7}**
  - **Full propagation: A: {7}, B: {6}, C: {5}**

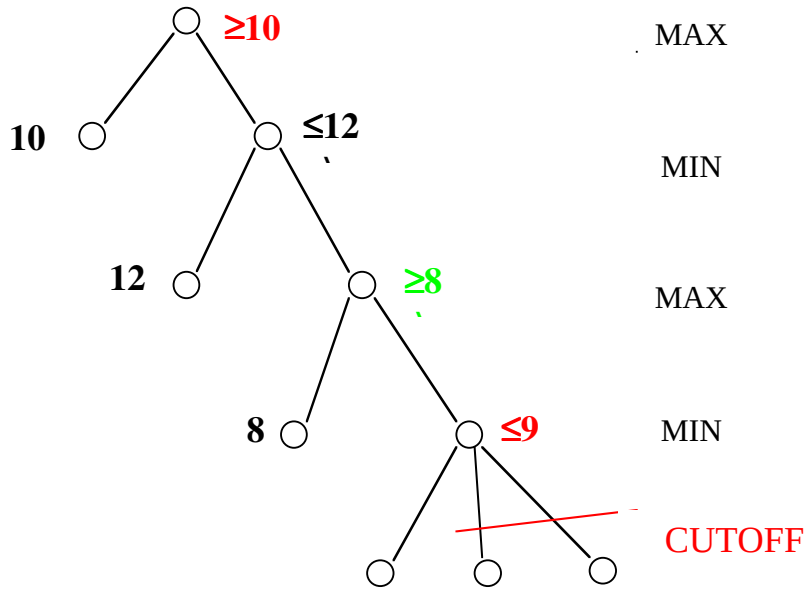
# Review

## CSP Algorithms

- **Simple backtrack:**
  - **Test only at leaves**
- **Backtrack with early pruning:**
  - **Test each constraint as soon as its vars are set**
- **Forward checking**
  - **When assign variable, establish arc consistency of new value with all unassigned variables**
- **Full lookahead**
  - **When assign variable, do full constraint propagation**



# Another Alpha Prune

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