More Examples of NP Complete Problems
TipOver
Rules of Game

Numbers are height of crate stack; If could get 4 high out of way we can attain goal
Problematic OR Gadget

Can go out where did not enter
Directional gadget

Single stack is two high;
tipped over stack is one high, two long;
red square is location of person travelling the towers
One directional Or gadget
AND Gadget

How AND Works
Variable Select Gadget

Tip A left to set x true; right to set x false
Can build bridge to go back but never to change choice
\((x \lor \neg x \lor y) \land (\neg y \lor z \lor w) \land \neg w)\)
Win Strategy is NP-Complete

• TipOver win strategy is NP-Complete
• Minesweeper consistency is NP-Complete
• Phutball single move win is NP-Complete
  – Do not know complexity of winning strategy
• Checkers is really interesting
  – Single move to King is in P
  – Winning strategy is PSpace-Complete