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