

## Being Clever at Games, aka Cheating

- When you play solitaire, does the computer cheat?
  - What would this mean?
- When you play chess, who wins?
  - Computer? You?
- When you play Poker?
  - [pokerstars.net](http://pokerstars.net)
  - [pokerstars.com](http://pokerstars.com)
- Hangman???



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15.1

## IBM Watson

<http://ibm.co/godoMD>

Watson was optimized to tackle a specific challenge: competing against the world's best Jeopardy! contestants



Beyond Jeopardy!, the IBM team is working to deploy this technology across industries such as healthcare, finance and customer service.

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## Computer is clever at Hangman?

- Cheating/clever NOT OK! : user guesses 't'
  - Computer says 'no occurrence of t'
  - Later secret word is 'chocolate'
- Clever IS OK: user guesses 't' knowing that word is six letters with third letter 'r': \_\_ r \_\_\_\_
  - Computer's secret word is 'street'
  - Computer says 'no occurrence of t'
    - Changes secret word to 'person'
  - Why is this ok?

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## How to program clever game?

- Suppose the possible words are those here:  
[ "OBOE", "NOON", "ODOR", "ROOM", "TRIP", "SOLO", "PICK", "FRAT", "HOOP" ]
- What happens if player guesses 'O' as the very first guess?
  - What should computer's secret word be?
- ["OBOE", "ODOR"] is an *equivalence class*
- ["NOON", "ROOM", "HOOP"] is too
- What about words with no O's?

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## Aside: Help in debugging programs

- Often very useful to print information
  - Contents of list, set, dictionary, ...
  - After computer winnows possible words?
  - After computer creates dictionary?
- We don't want debugging/print statements in released (final) code

```
if _DEBUG:
    for key in d:
        print key,d[key]
```

## How do we use global \_DEBUG?

- If it's a global variable we don't need to declare it when we use it in a function when ...
  - If we write/change global variable must declare
  - If we read/access, don't need to declare! Use this!
- Sometimes useful to create print/debug function

```
def debug(info):
    if _DEBUG:
        print info

debug("%s has len %d" % (key, d[key]))
```

## PHP, Rasmus Lerdorf and Others

- Rasmus Lerdorf
  - Qeqertarsuaq, Greenland
  - 1995 started PHP, now part of it
  - <http://en.wikipedia.org/wiki/PHP>
- Personal Home Page
  - No longer an acronym



- “When the world becomes standard, I will start caring about standards.”

Rasmus Lerdorf

## Clever and Python reminders

- Dictionary keys must be immutable
  - Strings are good, lists are bad, tuples are ok
  - When can you write `s[i] = 'c'`?
- Write a small amount of code and test it
  - Knowing where your bug is beats trying to find it
  - This is a skill you'll get much better at, but practice\*3
- This program combines ... lists, dictionaries, sorting (or max), strings,
  - Plus it's both frustrating and fun