61A Extra Lecture 2

Dice

Exact Chances for Rolling Dice

roll_dice(2, six_sided)

1   2   3   4   5   6   7   8   9   10   11   12

roll_dice(10, six_sided)
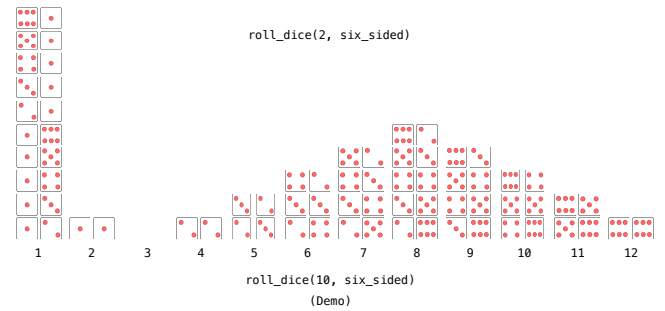
(Demo)

Hog: The End Game

You: 99   **You:** 92   **You:** 88   **You:** 80
Them: 99   **Them:** 99   **Them:** 99   **Them:** 99

What is the chance that I'll score *at least* **k** points rolling **n** six-sided dice?

(Demo)

S_n : Score from rolling n dice

t : A single outcome of rolling once

$$P(S_n \geq k) = \sum_{t=2}^{6} P(t) \cdot P(S_{n-1} \geq k - t)$$

(assuming no Pig Out!)

Memoization

(Demo)

Fill out bit.ly/61ahere

Twenty-One (Nim)

(Demo)

Twenty-One Rules

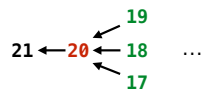Two players alternate turns, on which they can add 1, 2, or 3 to the current total

The total starts at 0

The game end whenever the total is 21 or more

The last player to add to the total loses

(Demo)

Some states are good; some are bad

```
                    19
21  ←  20  ←  18      ...
                    17
```

(Demo)

Hog Optimal Strategies

Contest Challenges

Larger state space than Nim & random transition function

Spring 2015 Optimal Strategy

* Rules: http://inst.eecs.berkeley.edu/~cs61a/sp15/proj/hog/

* Designed for what opponent?

Partial information: your strategy is not a function of the dice being used