Lecture #19: More Recursion

Announcements:

- **HKN Review Session** for CS 61A Exam 2
  Sunday, 4 March 2012
  3PM–6PM
  306 Soda (HP Auditorium)
- Occupy Woz (HKN tutors and CS 61A/CS 61C tutoring):
  Now–11PM Saturday, 3 March 2012
  Tutoring for CS 61A/CS 61C both days until 11 PM
  tinyurl.com/occupywoz

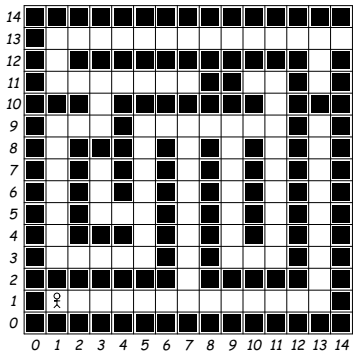
Example II: Counting Ways to Make Change

- Given the same arguments, how many different ways are there to make change?

```
def count_change(amount, coins = (50, 25, 10, 5, 1)):
    """A sequence of integers giving a number of each type of coin
    in COINS such that the value of the indicated numbers of coins
    will by exactly AMOUNT.
    >>> # 9 cents = 1 nickel and 4 pennies, or 9 pennies
    >>> count_change(9)
    2
    >>> # 12 cents = 1 dime and 2 pennies, 2 nickels and 2 pennies,
    >>> # 1 nickel and 7 pennies, or 12 pennies
    >>> count_change(12)
    4
    """
```


Example III: Escape from a Maze

- Consider a rectangular maze consisting of an array of squares some of which are occupied by large blocks of concrete:



- Given the size of the maze and locations of the blocks, prisoner, and exit, how does the prisoner escape?

Maze Program

```
def solve_maze(start, exit, maze):
    """Assume that 'maze' is a 2D array (list of lists) where
    maze[r][c] is true iff there is a concrete block occupying
    column 'c' of row 'r'.  'start' and 'exit' are (row,column)
    pairs indicating the initial position of the prisoner and the
    position of the exit.  Returns a sequence of (row,column)
    pairs starting with start and ending with exit indicating
    a sequence of empty squares that are adjacent to each other
    vertically or horizontally.
    """
    def search(p, visited):
        """Returns a list of pairs starting with 'p' and ending
        with 'exit' of empty, adjacent squares, none of which
        are contained in the list of squares 'visited'."""
        # FILL IN HERE

    return search(start, ())
```