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Tartalomjegyzék

Exercises

Dynamic programming

Pascal triangle

Write a function that returns the n^{th} row of the Pascal triangle as a list.

Paint Bucket Tool

Save the following "http://wiki.math.bme.hutext"http://wiki.math.bme.hu as a list of lists in python!

```
.....................................
...#######################...........
...#.....................#...........
...#.....................#...........
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...#.....................#...........
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...#.....................#######.....
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...#......##.....##............#.....
...#........#####..............#.....
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...#.....##....................#.....
...#...##......................#.....
...#############################.....
```

```
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```

Write a function **fill(x,y)** which fills a territory starting with the given coordinates, like the bucket tool in Paint.

Starting from the *(x, y)* coordinate replace **.** with **#**, if you encounter a **#** then stop. Do this recursively for every neighbor of the given point. This will fill out an enclosed territory.

Knight

Let's say that you have a knight on the chessboard. Calculate how many steps does it take to optimally reach the other places on the board.

Write a function **knight(x,y)** where the parameters are the *x, y* coordinates of the initial place. Return an 8-by-8 table of integers containing the minimum number of steps to reach that position. For example the initial state should have 0 on it.

Use a dynamic programming table!

Finite-state machine

Parenthesis

Given a string, replace the enclosed parts of the string with a **$** character. A formula is enclosed if it is surrounded by parenthesis. For example:

```
(xc)aa(c(b)) -> $$$$aa$$$$$$
```

Note that the parenthesis can be enclosed into each other.

Keystrokes

Download the following text file: raw_data.txt

This file contains keystroke data when someone was typing. The interesting part starts from the 5th line:

- The first column is an event: **keydown** or **keyup** (others are irrelevant now)
- The next three numbers encode the key, actually the second one is important (third column).
- The fourth column refers to capital or lowercase, but thats also irrelevant now.
- The last one is a timestamp, the number of milliseconds elapsed since January 1st, 1970.

The exercise is to process the keystrokes and reconstruct the typed text. Mind that there is a SHIFT key in the data.

Hint:

- Store a dictionary of keys which are pressed at a given time.
- if a key is released, and it was in the dictionary, then that letter was entered.
    - in this case, erase that key from the dictionary.
- store the state of the SHIFT key (up or down)

- There is also a BACKSPACE key!
- You can see the keycodes here

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