

# Assignment #A: dp & bfs

Updated 2 GMT+8 Nov 25, 2024

2024 fall, Compiled by 刘家亦, 物理学院

## 说明:

- 1) 请把每个题目解题思路（可选），源码Python, 或者C++（已经在Codeforces/Openjudge上AC），截图（包含Accepted），填写到下面作业模版中（推荐使用 typora <https://typoraio.cn>，或者用 word）。AC 或者没有AC，都请标上每个题目大致花费时间。
- 2) 提交时候先提交pdf文件，再把md或者doc文件上传到右侧“作业评论”。Canvas需要有同学清晰头像、提交文件有pdf、“作业评论”区有上传的md或者doc附件。
- 3) 如果不能在截止前提交作业，请写明原因。

## 1. 题目

### LuoguP1255 数楼梯

dp, bfs, <https://www.luogu.com.cn/problem/P1255>

思路：dp，但是直接写答案也可以

代码：

```
n = int(input())
dp = [0] * n
if n == 1:
    print(1)
    exit(0)
dp[0] = 1; dp[1] = 2
for i in range(2, n):
    dp[i] = dp[i - 1] + dp[i - 2]
print(dp[-1])
```

代码运行截图 (至少包含有"Accepted")

洛谷 / 评测记录 / 评测详情

R191211345 记录详情

编程语言Python 3

代码长度164B

用时160ms

内存4.97MB

测试点信息

源代码

测试点信息

#1AC16ms/3.63MB

#2AC16ms/3.72MB

#3AC16ms/3.71MB

#4AC16ms/3.72MB

#5AC15ms/3.71MB

#6AC16ms/3.65MB

#7AC16ms/3.66MB

#8AC16ms/3.71MB

#9AC15ms/4.05MB

#10AC18ms/4.97MB

canghaiyeming

所属题目P1255 数楼梯

评测状态Accepted

评测分数100

提交时间2024-11-26 14:12:34

27528: 跳台阶

dp, <http://cs101.openjudge.cn/practice/27528/>

思路：一道数学题

代码：

```
print(2 ** (int(input()) - 1))
```

代码运行截图 == (至少包含有"Accepted") ==

CS101 / 题库 (包括计概、数算题目)

题目

排名

状态

提问

#47512279提交状态

查看

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统计

提问

状态: Accepted

源代码

```
print(2 ** (int(input()) - 1))
```

基本信息

#: 47512279

题目: 27528

提交人: 24n2400011431|沧海月明

内存: 3588kB

时间: 29ms

语言: Python3

提交时间: 2024-12-02 11:43:01

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English

帮助

关于

# 474D. Flowers


dp, <https://codeforces.com/problemset/problem/474/D>

思路：和某道每日选做很像

代码：

```
t, k = map(int, input().split())
mod = 10 ** 9 + 7
dp = [1] * (10 ** 5 + 1)
dp[k - 1] = 2
for i in range(k, 10 ** 5 + 1):
    dp[i] = (dp[i - 1] + dp[i - k]) % mod
pre_sum = [0] * (10 ** 5 + 2)
for i in range(1, 10 ** 5 + 2):
    pre_sum[i] = (pre_sum[i - 1] + dp[i - 1]) % mod
ans = []
for _ in range(t):
    a, b = map(int, input().split())
    ans.append((pre_sum[b] - pre_sum[a - 1]) % mod)
print(*ans, sep='\n')
```

代码运行截图 (至少包含有"Accepted")

 **CODEFORCES**  
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PROBLEMS SUBMIT CODE MY SUBMISSIONS **STATUS** HACKS ROOM STANDINGS CUSTOM INVOCATION

General										
#	Author	Problem	Lang	Verdict	Time	Memory	Sent	Judged		
293310592	Practice: <a href="#">jiayiliu250</a>	<a href="#">474D</a> - 15	Python 3	Accepted	436 ms	14560 KB	2024-11-26 09:38:36	2024-11-26 09:38:36	★	<a href="#">Compare</a>

→ Source

```
t, k = map(int, input().split())
mod = 10 ** 9 + 7
dp = [1] * (10 ** 5 + 1)
dp[k - 1] = 2
for i in range(k, 10 ** 5 + 1):
    dp[i] = (dp[i - 1] + dp[i - k]) % mod
pre_sum = [0] * (10 ** 5 + 2)
for i in range(1, 10 ** 5 + 2):
    pre_sum[i] = (pre_sum[i - 1] + dp[i - 1]) % mod
ans = []
for _ in range(t):
    a, b = map(int, input().split())
    ans.append((pre_sum[b] - pre_sum[a - 1]) % mod)
print(*ans, sep='\n')
```

Copy

[Click](#) to see test details

# LeetCode5.最长回文子串

dp, two pointers, string, <https://leetcode.cn/problems/longest-palindromic-substring/>

思路：马拉车还是蛮难想的，算法实现的细节很多

代码：

```
class Solution:
```

```

def expand(self, s, i, j):
    while 0 <= i and j < len(s) and s[i] == s[j]:
        i -= 1
        j += 1
    return (j - i - 2) // 2

def longestPalindrome(self, s: str) -> str:
    s = '#' + '#'.join(list(s)) + '#'
    length = [0] * len(s)
    right = -1
    j = -1
    start = 0; end = 0
    for i in range(len(s)):
        if right >= i:
            i_sym = 2 * j - i
            arm_len = min(right - i, length[i_sym])
            length[i] = self.expand(s, i - arm_len - 1, i + arm_len + 1)
        else:
            length[i] = self.expand(s, i, i)
        if i + length[i] > right:
            j = i
            right = i + length[i]
        if 2 * length[i] + 1 > end - start:
            end = i + length[i]
            start = i - length[i]
    return s[start + 1:end + 1:2]

```

代码运行截图 (至少包含有"Accepted")

The screenshot shows a coding competition interface. On the left, there is a table of submission records:

所有状态	所有语言	执行用时	消耗内存	备注
通过	Python3	55 ms	17.4 MB	
通过	Python3	198 ms	17.3 MB	
通过	Python3	203 ms	17 MB	

On the right, the code editor shows the same Python code as above. Below the code editor, there is a section for test cases:

测试用例

Case 1 Case 2 +

s =

"babad"

## 12029: 水淹七军

bfs, dfs, <http://cs101.openjudge.cn/practice/12029/>

思路：卡在这个逆天输入上，矩阵的读取一直不对，还没发现。提交了28次

代码:

```
from collections import deque
import sys
input = sys.stdin.read
idx = 1
input = input().split()
results = []
for _ in range(int(input[0])):
    m, n = map(int, input[idx:idx + 2]); idx += 2
    matrix = []
    for _ in range(m):
        matrix.append(list(map(lambda x:[int(x), 0], input[idx:idx + n])))
        idx += n
    x, y = map(int, input[idx:idx + 2]); idx += 2
    flag = False
    p = int(input[idx]); idx += 1
    for i in range(p):
        a, b = map(int, input[idx:idx + 2]); idx += 2
        h = matrix[a - 1][b - 1][0]
        if h <= matrix[x - 1][y - 1][0]:
            continue
        q = deque([[a - 1, b - 1]])
        if h > matrix[a - 1][b - 1][1]:
            matrix[a - 1][b - 1][1] = h
        while q:
            i, j = q.popleft()
            for di, dj in [(-1, 0), (1, 0), (0, -1), (0, 1)]:
                if 0 <= i + di < m and 0 <= j + dj < n and\
                    matrix[i + di][j + dj][0] < h and matrix[i + di][j + dj][1] <
h:
                    q.append([i + di, j + dj])
                    matrix[i + di][j + dj][1] = h
            results.append("Yes" if matrix[x - 1][y - 1][0] < matrix[x - 1][y - 1][1]
else "No")
sys.stdout.write("\n".join(results) + "\n")
```

代码运行截图 (至少包含有"Accepted")

状态: Accepted

源代码

```
from collections import deque
import sys
input = sys.stdin.read
idx = 1
input = input().split()
results = []
for _ in range(int(input[0])):
    m, n = map(int, input[idx:idx + 2]); idx += 2
    matrix = []
    for _ in range(m):
        matrix.append(list(map(lambda x: int(x), 0), input[idx:idx + n]))
        idx += n
    X, Y = map(int, input[idx:idx + 2]); idx += 2
    flag = False
    p = int(input[idx]); idx += 1
    for i in range(p):
        a, b = map(int, input[idx:idx + 2]); idx += 2
        h = matrix[a - 1][b - 1][0]
        if h <= matrix[X - 1][Y - 1][0]:
            continue
        q = deque([[a - 1, b - 1]])
        if h > matrix[a - 1][b - 1][1]:
            matrix[a - 1][b - 1][1] = h
        while q:
            i, j = q.popleft()
            for di, dj in [(-1, 0), (1, 0), (0, -1), (0, 1)]:
                if 0 <= i + di < m and 0 <= j + dj < n and \
                    matrix[i + di][j + dj][0] < h and matrix[i + di][j + dj][1] < h:
                    q.append([i + di, j + dj])
                    matrix[i + di][j + dj][1] = h
            results.append("Yes" if matrix[X - 1][Y - 1][0] < matrix[X - 1][Y - 1][1] else "No")
    sys.stdout.write("\n".join(results) + "\n")
```

基本信息

#: 47435290

题目: 12029

提交人: 24n2400011431|沧海月明

内存: 7012kB

时间: 353ms

语言: Python3

提交时间: 2024-11-27 22:48:28

## 02802: 小游戏

bfs, <http://cs101.openjudge.cn/practice/02802/>

思路: 也可以用dijkstra算法

代码:

```
from collections import deque
idx = 0
directions = [(1, 0), (-1, 0), (0, 1), (0, -1)]
while True:
    idx += 1
    case = 0
    w, h = map(int, input().split())
    if w == h == 0:
        break
    print(f'Board #{idx}:')
    board = [[' ']*(w + 2)] + [[' ']+list(input())+' ' for _ in range(h)] + [[' ']*(w + 2)]
    while True:
        x1, y1, x2, y2 = map(lambda x: int(x), input().split())
        case += 1; flag = False
        if x1 == y1 == x2 == y2 == 0:
            break
        visited = [[False]*(w + 2) for _ in range(h + 2)]
        board[y2][x2] = ' '
        q = deque([(x1, y1, -1, 0)])
```

```

visited[y1][x1] = True
while q:
    i, j, prediction, depth = q.popleft()
    if i == x2 and j == y2:
        flag = True
        break
    for _ in range(4):
        ni = i + directions[_][0]; nj = j + directions[_][1]
        if 0 <= ni < w + 2 and 0 <= nj < h + 2 and board[nj][ni] == ' '
and not visited[nj][ni]:
        visited[nj][ni] = True
        if _ != prediction:
            q.append((ni, nj, _, depth + 1))
        else:
            q.append((ni, nj, _, depth))

if flag:
    print(f'Pair {case}: {depth} segments.')
else:
    print(f'Pair {case}: impossible.')
board[y2][x2] = 'X'
print()

```

代码运行截图 (至少包含有"Accepted")

#47435991提交状态

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状态: Accepted

源代码

```

from collections import deque
idx = 0
directions = [(1, 0), (-1, 0), (0, 1), (0, -1)]
while True:
    idx += 1
    case = 0
    w, h = map(int, input().split())
    if w == h == 0:
        break
    print(f'Board #{idx}:')
    board = [[' ']*(w+2)] + [list(input()) + [' ']] for _ in range(h)
    while True:
        x1, y1, x2, y2 = map(lambda x: int(x), input().split())
        case += 1; flag = False
        if x1 == y1 == x2 == y2 == 0:
            break
        visited = [[False]*(w+2) for _ in range(h+2)]
        board[y2][x2] = ' '

        q = deque([(x1, y1, -1, 0)])
        visited[y1][x1] = True
        while q:
            i, j, prediction, depth = q.popleft()
            if i == x2 and j == y2:
                flag = True
                break
            for _ in range(4):
                ni = i + directions[_][0]; nj = j + directions[_][1]
                if 0 <= ni < w + 2 and 0 <= nj < h + 2 and board[nj][ni]

```

基本信息

#: 47435991  
 题目: 02802  
 提交人: 24n2400011431|沧海月明  
 内存: 3756kB  
 时间: 49ms  
 语言: Python3  
 提交时间: 2024-11-27 23:42:06

## 2. 学习总结和收获

如果作业题目简单, 有否额外练习题目, 比如: OJ"计概2024fall每日选做"、CF、LeetCode、洛谷等网站题目。

额外跟进每日选做以及leetcode